Service Manual

4×4

Vyper 4WD 1100cc

Vyper 4WD 1100cc 4 seater

FOREWORD

This service manual is designed primarily for use by certified XINYANG Master Service Dealer technicians in a properly equipped shop and should be kept available for reference. All references to left and right side of the vehicle are from the operator's perspective when seated in a normal riding position.

Some procedures outlined in this manual require a sound knowledge of mechanical theory, tool use, and shop procedures in order to perform the work safely and correctly. Technicians should read the text and be familiar with service procedures before starting the work. Certain procedures require the use of special tools. Use only the proper tools as specified.

This manual contains an introductory description of procedures for inspection, maintenance, overhaul, disassembly & assembly, removal and installation of components and parts, troubleshooting and service data together with illustrations of our vehicle Model XY1100UE and XY1100UEL.

The manufacturer reserves the right to make improvements or modifications to the products without prior notice. Overhaul and maintenance should be done according to the actual state and condition of the vehicle.

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A Few Words About Safety

Service Information

The service and repair information contained in this manual is intended for use by qualified, professional technicians.

Attempting service or repairs without the proper training, tools, and equipment could cause injury to you or others, It could also damage the vehicle or create an unsafe condition.

This manual describes the proper methods and procedures for performing service, maintenance, and repairs. Some procedures require the use of specially designed tools and dedicated equipment. Any person who intends to use a replacement part, service procedure or a tool that is not recommended by XinYang, must determine the risks to their personal safety and the safe operation of the vehicle. If you need to replace a part, use genuine XinYang parts with the correct part number or an equivalent part. We strongly recommend that you do not use replacement parts of inferior quality.

For Your Customer is Safety

Proper service and maintenance are essential to the customer is safety and the reliability of the vehicle. Any error or oversight while servicing a vehicle can result in faulty operation, damage to the vehicle, or injury to others.

For Your Safety

Because this manual is intended for the professional service technician, we do not provide warnings about many basic shop safety practices (e.g., Hot parts-wear gloves). If you have not received shop safety training or do not feel confident about your knowledge of safe servicing practice, we recommended that you do not attempt to perform the procedures described in this manual.

Some of the most important general service safety precautions are given below. However, we cannot warn you of every conceivable hazard that can arise in performing service and repair and procedures. Only you can decide whether or not you should perform a given task, can cause you to be seriously hurt or killed.

Important Safety Precautions

Make sure you have a clear understanding of all basic shop safety practices and that you are

wearing appropriate clothing and using safety equipment. When performing any service task, be especially careful of the following:

- Read all of the instructions before you begin, and make sure you have the tools, the replacement or repair parts, and the skills required to perform the tasks safely and completely.
- Protect your eyes by using proper safety glasses, goggles or face shields any time you hammer, drill, grind, pry or work around pressurized air or liquids, and springs or other stored-energy components. If there is any doubt, put on eye protection.
- Use other protective wear when necessary, for example gloves or safety shoes. Handing hot or sharp parts can cause severe burns or cuts. Before you grab something that looks like it can hurt you, stop and put on gloves.
- Protect yourself and others whenever you have the vehicle up in the air. Any time you lift the vehicle, either with a hoist or a jack, make sure that it is always securely supported. Use jack stands.

Make sure the engine is off before you begin any servicing procedures, unless the instruction tells you to do otherwise. This will help eliminate several potential hazards;

- Carbon monoxide poisoning from engine exhaust, Be sure there is adequate ventilation whenever you run the engine.
- Burns from hot parts or coolant. Let the engine and exhaust system cool before working in those areas.
- Injury from moving parts. If the instruction tells you to run the engine, be sure your hands, fingers and clothing are out of the way.

Gasoline vapors and hydrogen gases from batteries are explosive. To reduce the possibility of a fire or explosion, be careful when working around gasoline or batteries.

- Use only a nonflammable solvent, not gasoline, to clean parts.
- Never drain or store gasoline in an open container.
- Keep all cigarettes, sparks and flames away from the battery and all fuel-related parts.

Conversion Table

Item	Example	Conversion
Pressure	200Kpa(2.00kgf/cm^2) 33kpa(250mmHg)	1kgf/cm^2=98.0665kpa 1kpa=1000pa 1mmHg=133.322Pa=0.133322Kps
Torque	18N· m(1.8kgf-m)	1kgf· m=9.80665N· m
Volume	419ml	1ml=1 cm^3=1cc 1l=1000cm^3
Force	12N(1.2kgf)	1kgf=9.80665N

Cleaning Parts

Cleaning parts is one of the more tedious and difficult service jobs performed in the home garage. Many types of chemical cleaners and solvents are available for shop use. Most are poisonous and extremely flammable. To prevent chemical exposure, vapor buildup, fire and serious injury, observe each product warning label and note the following:

1. Read and observe the entire product label before using any chemical. Always know what type of chemical is being used and whether it is poisonous and/or flammable.
2. Do not use more than one type of cleaning solvent at a time. If mixing chemicals is required, measure the proper amounts according to the manufacturer.
3. Work in a well-ventilated area.
4. Wear chemical-resistant gloves.
5. Wear safety glasses.
6. Wear a vapor respirator if the instructions call for it.
7. Wash hands and arms thoroughly after cleaning parts.
8. Keep chemical products away from children and pets.
9. Thoroughly clean all oil, grease and cleaner residue from any part that must be heated.
10. Use a nylon brush when cleaning parts. Metal brushes may cause a spark.
11. When using a parts washer, only use the solvent recommended by the manufacturer. Make sure the parts washer is equipped with a metal lid that will lower in case of fire.

Warning Labels

Most manufacturers attach information and warning labels to the UTV. These labels contain instructions that are important to personal safety when operating, servicing, transporting and storing the UTV. Refer to the owner's manual for the description and location of labels. Order replacement labels from the manufacturer if they are missing or damaged.

FASTENERS

Proper fastener selection and installation is important to ensure the motorcycle operates as designed and can be serviced efficiently. The choice of original equipment fasteners is not arrived at by chance. Make sure replacement fasteners meet all the same requirements as the originals
Many screws. Bolts and studs are combined with nuts to secure particular components. to indicate the size of a nut. Manufactures specify the internal diameter and the thread pitch
The measurement across two flats on a nut or bolt indicates the wrench size

Warning ***: Do not install fasteners with a strength classification lower than what was originally installed by the manufacturer doing so may cause equipment failure and or damage***

Torque Specifications

The material used in the manufacturing of the UTV may be subjected to uneven stresses if the fasteners of the various subassemblies are not installed and tightened correctly. Fasteners that are improperly installed or work loose can cause extensive damage. it is essential to use an accurate torque wrench as described in this chapter.

Self-Locking Fasteners

Several types of bolts. Screws and nuts incorporate a system that creates interference between the two fasteners. Interference is achieved in various ways. The most common types are the nylon insert nut and a dry adhesive coating on the threads of a blot.
Self-locking fasteners offer greater holding strength than standard fasteners, which improves their resistance to vibration. All self-locking fasteners cannot be reused. The materials used to from the lock become distorted after the initial installation and removal. Discard and replace self-locking fasteners after removing them. Do not replace self-locking fasteners with standard fasteners.

Washers

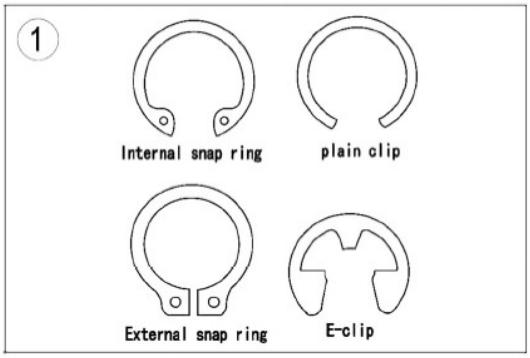
The two basic types of washers are flat washers and lock washers. Flat washers are simple discs with a hole to fit a screw or bolt. Lock washers are used to prevent a fastener from working loose. Washers can be used as spacers and seals. Or can help distribute fastener load and prevent the fastener from damaging the component
As with fasteners. When replacing washers make sure the replacement washers are of the same design and quality

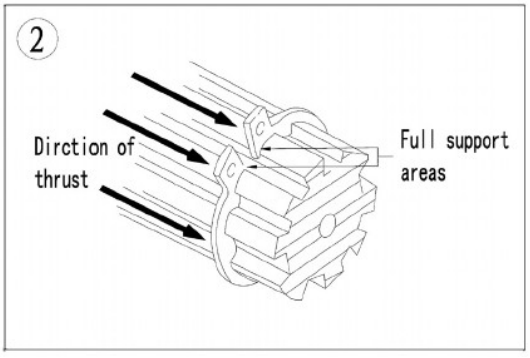
Cotter Pins

A cotter pin is a split metal pin inserted into a hole or slot to prevent a fastener from loosening. In certain applications, such as the rear axle on an UTV or motorcycle, the fastener must be secured in this way. For these applications. A cotter pin and castellated (slotted) nut is used.
To use a cotter pin, first make sure the diameter is correct for the hole in the fastener. Aster correctly tightening the fastener and aligning the holes, insert the cotter pin through the hole and bend the ends over the fastener, Unless instructed to do so, never loosen a tightened fastener to align the holes. If the holes do not align. Tighten the fastener enough to achieve alignment
Cotter pins are available in various diameters and lengths. Measure the length from the bottom of the head to the tip of the shortest pin.

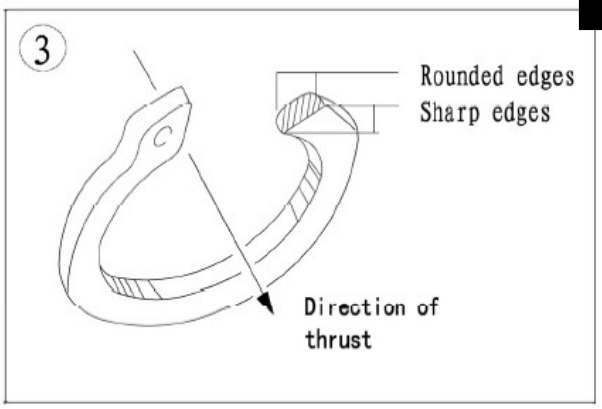
Snap Rings and E-clips

Snap rings (**Figure 1**) are circular-shaped metal retaining clips. They secure parts in place on parts such as shafts. External type snap rings are used to retain items on shafts. Internal type snap rings secure parts within housing bores. In some applications. in addition to securing the component(s). snap rings of varying thicknesses also determine endplay. These are usually called selective snap rings.
The two basic types of snap rings are machined and stamped snap rings. Machined snap rings (**Figure 2**) can be installed in either direction. Because both faces have sharp edges. Stamped snap rings (**Figure 3**) are manufactured with a sharp and a round edge. When installing a stamped snap ring in a thrust





application, install the sharp edge facing away from the part producing the thrust.
E-clips are used when it is not practical to use a snap ring. Remove E-clips with a flat blade screwdriver by prying between the shaft and E-clip. To install an E-clip. Center it over the shaft groove and push or tap it into place
Observe the following when installing snap rings:
1. Remove and install snap rings with snap rings pliers. Refer to *Basic Tools* in this chapter
2. In some applications. it may be necessary to replace snap rings after removing them
3. Compress or expand snap rings only enough to install them. If overly expanded. Lose their retaining ability
4. After installing a snap ring. Make sure it seats completely
5. Wear eye protection when removing and installing snap rings



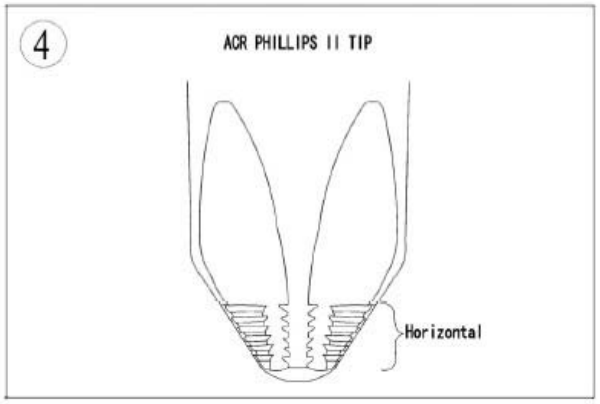
BASIC TOOLS

Most of the procedures in this manual can be carried out with basic hand tools and test equipment familiar to the home mechanic. Always use the correct tools for the job. Keep tools organized and clean. Store them in a tool chest with related tools organized together.
Quality tools are essential. The best are constructed of high-strength alloy steel. These tools are light, easy to use and resistant to wear. Their working surface is devoid of sharp edges and carefully polished. They have an easy-to-clean finish and are comfortable to use. Quality tools are a good investment.
Some of the procedures in this manual specify special tools. In many cases the tools is illustrated in use. Those with a large tool kit may be able to replacement. However, in some cases, the specialized equipment or expertise may make it impractical for the home mechanic to attempt the procedure. When necessary, such operations are recommended to have a dealership or specialist perform the task. It may be less expensive to have a professional perform these jobs, especially when considering the cost of equipment.
When purchasing tools to perform the procedures covered in this manual, consider the tool's potential frequency of use. If a tool kit is just now being started. Consider purchasing a basic tool set from a quality tool combinations and offer substantial savings when complicated, specialized tools can be added.

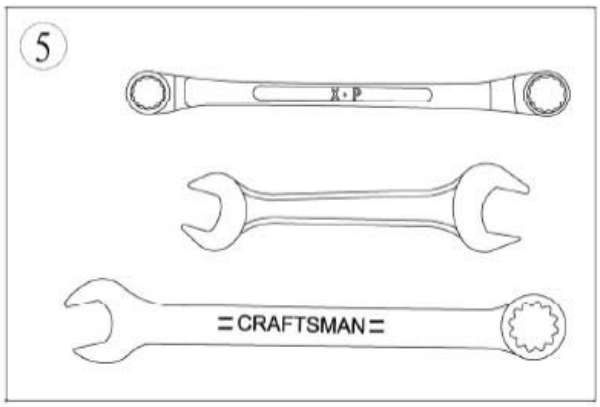
Screwdrivers

Screwdrivers of various lengths and types are mandatory for the simplest tool kit. The two basic types are the slotted tip (flat blade) and the Phillips tip. These are available in sets that often include an assortment of tip size and shaft lengths.
As with all tools, use a screwdriver designed for the job. Make sure the size of the fastener. Use them only for driving screws. Never use a screwdriver for prying or chiseling metal. Repair or replace worn or

damaged screwdrivers. A worn tip may damage the fastener, making it difficult to remove.
Phillips-head screws are often damaged by incorrectly fitting screwdrivers. Quality Phillips screwdrivers are manufactured with their crosshead tip machined to Phillips Screw Company specifications. Poor quality or damaged Phillips screwdrivers can back out (cam out) and round over the screw head. In addition. Weak or soft screw materials can make removal difficult. The best type of screwdriver to use on Phillips screw is the ACR Phillips II screwdriver, patented by the horizontal anti-cam out ribs found on the driving faces or flutes of the screwdriver's tip (**figure 4**). ACR Phillips II screwdrivers were designed as part of a manufacturing drive system to be used with ACR Phillips II screws, but they work of tool companies offer ACR Phillips II screwdrivers in different Tip size and interchangeable bits to fit screwdriver bit holders.

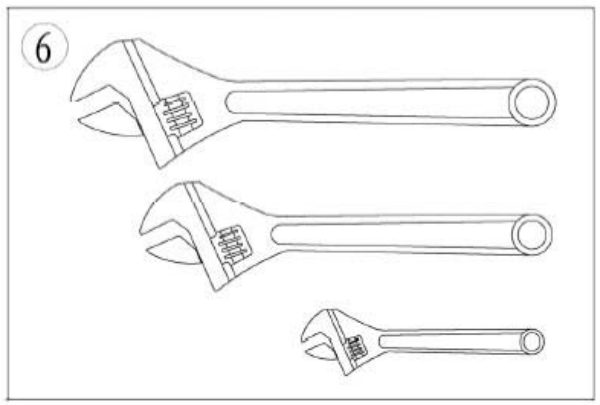


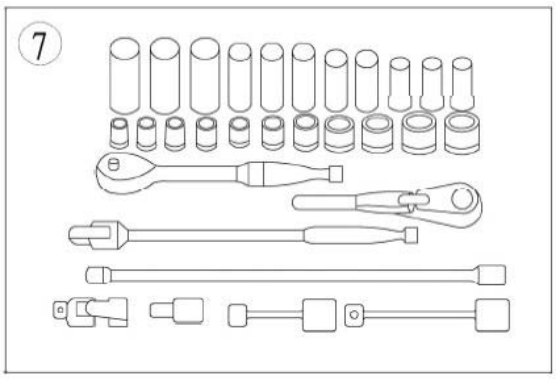
NOTE:
Another way to prevent cam out and to increase the grip of a Phillips screwdriver is to apply valve grinding compound or permute screw ＆ socket Gripper onto the screwdriver tip. After loosening/ tightening the screw, clean the screw recess to prevent engine oil contamination.



Wrenches

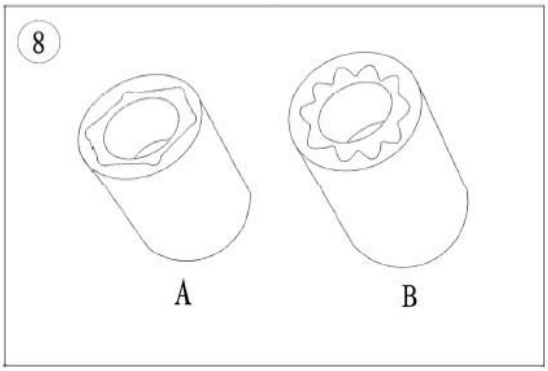
Open-end, box-end and combination wrenches (**figure 5**) are available in a variety of types and sizes. The number stamped on the wrench refers to the distance of the fastener head.
The box-end wrench is an excellent tool because it grips the fastener on all sides. This reduces the chance of the tool slipping. The box-end wrench is designed with either a 6 or 12-point opening. For stubborn or damaged fasteners, the 6-point provides superior holding because it contacts the fastener across a wider area at all six edges. For general use, the 12-point works well. It allows the wrench to be removed and reinstalled without moving the handle over such a wide are.





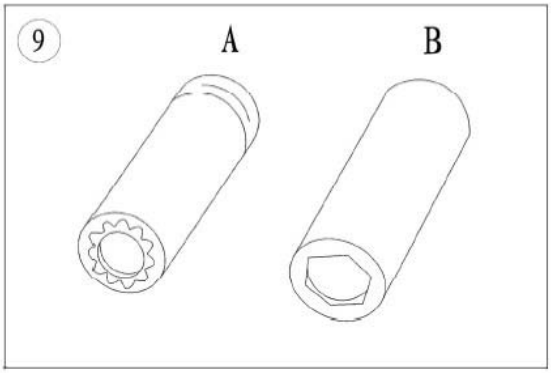
An open-end wrench is fast and works best in areas with limited overhead access. It contacts the fastener at only two points and is subject to slipping if under heavy force, or if the tool or fastener is worn. A

box-end wrench is preferred in most instances, especially when braking loose and applying the final tightness to a fastener.
The combination wrench has a box-end on one end and an open-end on one end and an open-end on the other. This combination makes it a convenient tool.

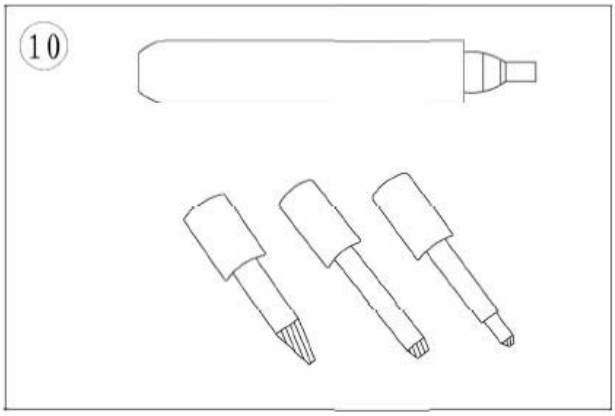


Adjustable wrenches

An adjustable wrench or Crescent wrench (**Figure 6**) can fit nearly any nut or bolt head that has clear access around its entire perimeter. An adjustable wrench is best used as a backup wrench to keep a large nut or bolt from turning while the other end is being loosened or tightened with a box-end or socket wrench.
Adjustable wrenches contact the fastener at only two points, which makes them more subject to slipping off the fastener. Because one jaw is adjustable and may become loose, this shortcoming is aggravated. Make certain the solid jaw is the one transmitting the force.



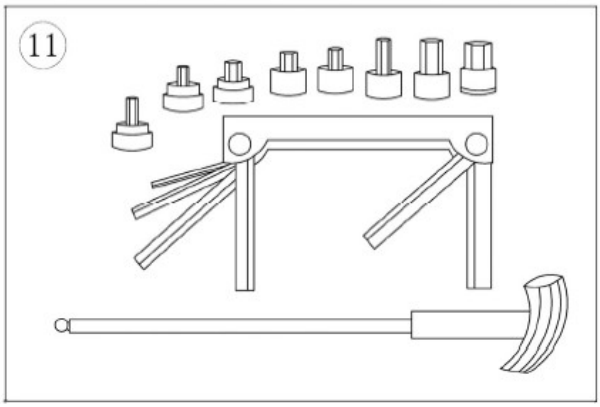
Socket Wrenches, Ratchets and Handles



Sockets that attach to a ratchet handle (**Figure 7**) are available with 6-point or 12-point openings (**Figure8**) and different drive sizes. The drive size Indicates the size of the square hole that accepts the Ratchet handle. The number stamped on the socket is the size of the work area and must the fastener head As with wrenches. a 6-point provides superior-holding ability. While a 12-point socket needs to be moved only half as for to reposition it on the fastener
Sockets are designated for either hand or impact use. Impact sockets are made of thicker material for more durability. Compare the size and wall thickness of a 19-mmhand socket (A, **Figure 9**) and the 19-mm impact socket (B). Use impact sockets when using an impact driver or air tools. Use hand sockets with hand-driven attachments

WARNING:
Do not use hand sockets with air or impact tools because they may shatter and cause injury.
Always wear eye protection when using impact or air tools

Various handles are available for sockets. Use the speed handle for fast operation. Flexible ratchet heads in varying length allow the socket to be turned with varying force and at odd angles. Extension bars allow the socket setup to reach difficult areas. The ratchet is the most versatile. It allows the user to install or remove the nut without removing the socket.
Sockets combined with any number of drivers make them undoubtedly the fastest. Safest and most convenient tool for fastener removal and installation

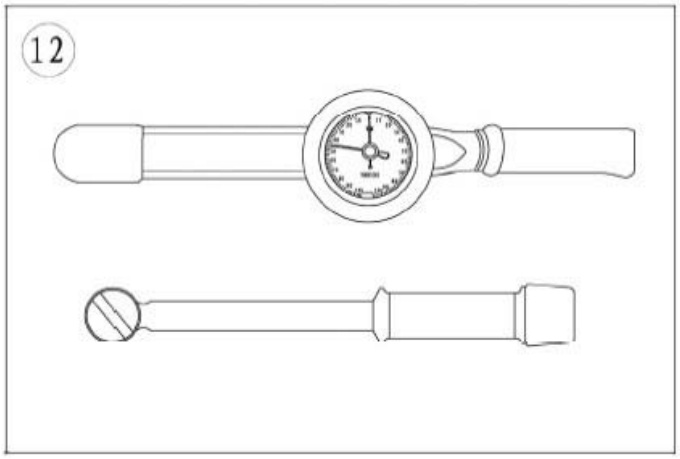


Impact Drivers

An impact driver provides extra force for removing fasteners by converting the impact of a hammer into a turning motion. This makes it possible to remove stubborn fasteners without damaging them. Impact drivers and interchangeable bits (**Figure 10**) are available from most tool suppliers.When using a socket with an impact driver. Make sure the socket is designed for impact use. Refer to Socket Wrenches. Ratchets and handles in this section.

WARNING:

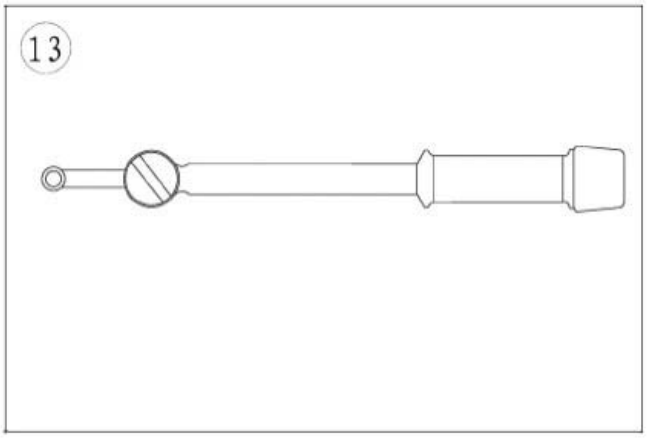
Do not use hand sockets with air or impact tools because they may shatter and cause injury. Always wear eye protection when using impact or air tools



Allen Wrenches

Use Allen or setscrew wrenches (**Figure 11**) on fasteners with hexagonal recesses in the fastener head. These wrenches are available in L-shaped bar. Socket and T-handle types. A metric set is required when working on most motorcycles. Allen bolts are sometimes called socket bolts.

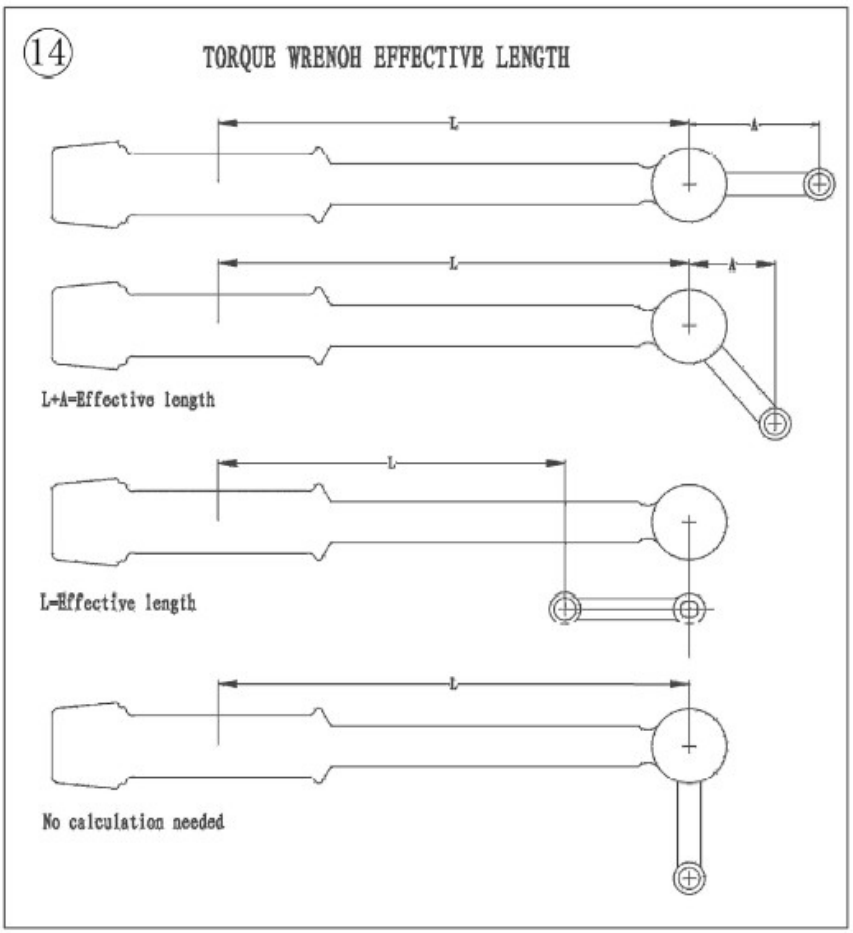
Torque Wrenches



Use a torque wrench with a socket, torque adapter or similar extension to tighten a fastener to a measured torque. Torque wrenches come in several drive sizes (1/4, 3/8, 1/2 and 3/4) and have various methods of reading the torque value. The drive size indicates the size of the square drive that accepts the socket, adapter or extension. Common methods of reading the torque value are the deflecting beam, the dial indicator and the audible click (**Figure 12**). When choosing a torque wrench, consider the torque range, drive size and accuracy. The torque specifications in this manual provide an indication of the range required.

A torque wrench is a precision tool that must be properly cared for to remain accurate. Store torque wrenches in cases or separate padded drawers within a toolbox. Follow the manufacturer's instructions for their care and calibration.

Torque Adapters



Torque adapters or extensions extend or reduce the reach of a torque wrench. The torque adapter shown in (**Figure 13**) is used to tighten a fastener that cannot be reached because of the size of the torque wrench head, drive, and socket. If a torque adapter changes the effective lever length (**Figure 14**), the torque reading on the wrench will not equal the actual torque applied to the fastener. It is necessary to recalibrate the torque setting on the wrench to compensate for the change of lever length. When using a torque adapter at a right angle to the drive head, calibration is not required, because the effective length has not changed.

To recalculate a torque reading when using a torque adapter, use the following formula and refer to **Figure 14:**

TW = TA×L

L+A

TW is the torque setting or dial reading on the wrench.

TA is the torque specification and the actual amount of torque that is applied to the fastener.

A is the amount that the adapter increases (or in some cases reduces) the effective lever length as measured along the centerline of the torque wrench.

L is the lever length of the wrench as measured from the center of the drive to the center of the grip. The effective length is the sum of L and A.

Example:

TA=20 ft.-lb.

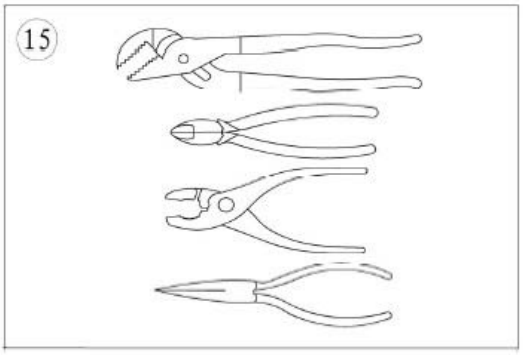
A=3in.

L=14in.

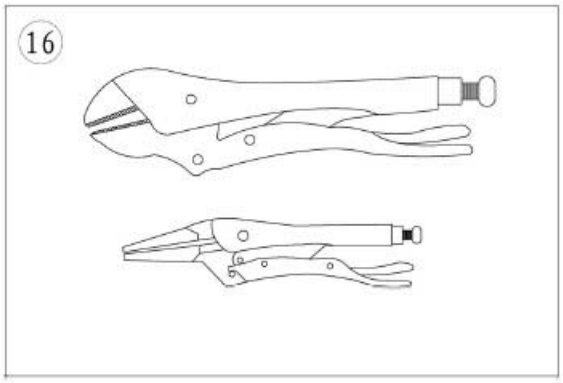
TW=20×14=280=16.5 ft. - lb.

14+3 = 17

In this example, the torque wrench would be set to the recalculated torque value (TW = 16.5 ft. –lb.).

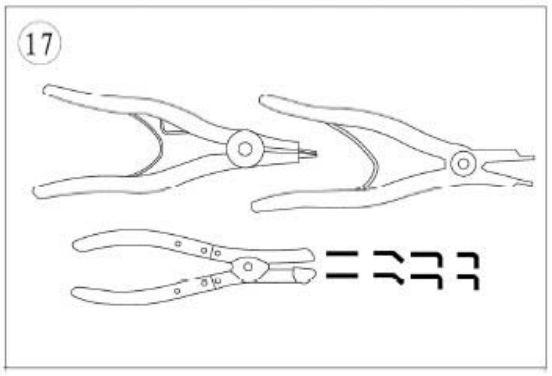


When using a beam-type wrench, tighten the fastener until the pointer aligns with 16.5 ft. –lb. In this example, although the torque wrench is pre set to 16.5 ft. –lb., the actual torque is 20 ft. –lb.



Pliers

Pliers come in a wide range of types and sizes. Pliers are useful for holding, cutting, bending, and crimping. Do not use them to turn fasteners. **Figure 15 and Figure 16** show several types of useful pliers. Each design has a specialized function. Slip-joint pliers are general – purpose pliers used for gripping and bending. Diagonal cutting pliers are needed to cut wire and can be used to remove cotter pins. Use needle nose pliers to hold or bend small objects. Locking pliers (**Figure 16**), sometimes called Vise-Grips, are used to hold objects very tightly. They have many uses ranging from holding two parts together, to gripping the end of a broken stud. Use caution when using locking pliers, as the sharp jaws will damage the objects they hold.



Snap Ring Pliers

Snap ring pliers are specialized pliers with tips that fit into the ends of snap rings to remove and install them. Snap ring pliers (**Figure 17**) are available with a fixed action (either internal or external) or convertible (one tool works on both internal and external snap rings). They may have fixed tips or interchangeable ones of various sizes and angles. For general use, select a convertible type pliers with interchangeable tips (**Figure 17**).

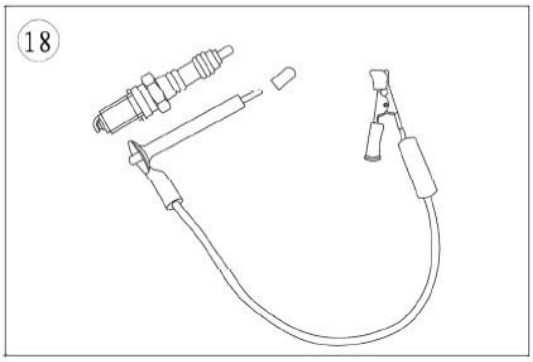
WARNING:
Snap rings can slip and fly off when removing and installing them. Also, the snap ring pliers tips may break. Always wear eye protection when using snap ring pliers.

Hammers

Various types of hammers are available to fit a number of applications. Use a ball-peen hammer to strike another tool, such as a punch or chisel. Use soft-faced hammers when a metal object must be struck without damaging it. Never use a metal-faced hammer on engine and suspension components because damage occurs in most cases.

Always wear eye protection when using hammers. Make sure the hammer face is in good condition and the handle is not cracked. Select the correct hammer for the job and make sure to strike the object squarely. Do not use the handle or the side of the hammer to strike an object.

Ignition Grounding Tool

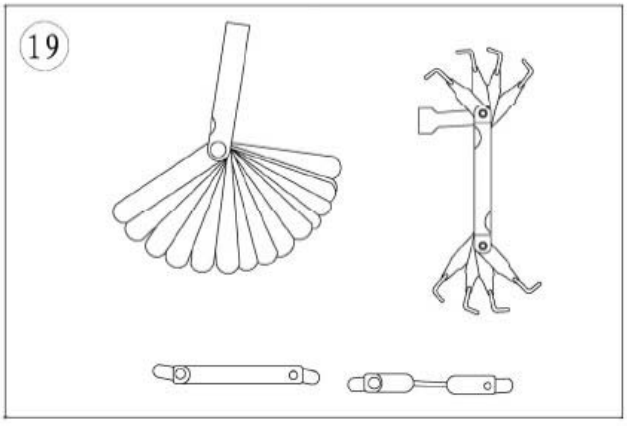


Some test procedures require turning the engine over without starting it. To prevent damage to the ignition system from excessive resistance or the possibility of fuel vapor being ignited by an open spark, remove the spark plug cap and ground it directly to a good engine ground with the tool shown in (**Figure 18**).
Make the tool shown from a No.6 screw and nut, two washers, length of tubing, alligator clip, electrical eyelet and a length of wire.

PRECISION MEASURING TOOLS

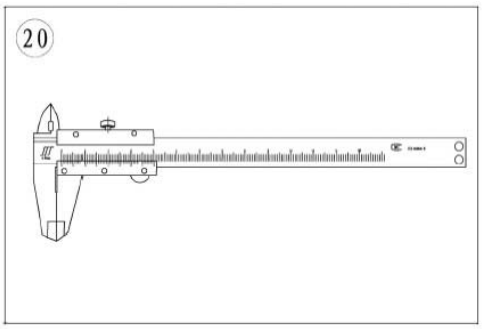
The ability to accurately measure components is essential to perform many of the procedures described in this manual. Equipment is manufactured to close tolerances, and obtaining consistently accurate measurements is essential to determine which components require replacement or further service.
Each type of measuring instrument is designed to measure a dimension with a certain degree of accuracy and within a certain range. When selecting the measuring tool, make sure it is applicable to
the task.
As with all tools, measuring tools provide the best results if cared for properly. Improper use can damage the tool and cause inaccurate results. If any measurement is questionable, verify the measurement using another tool. A standard gauge is usually provided with micrometers to check accuracy and calibrate the tool if necessary.
Precision measurements can vary according to the experience of the person performing the procedure. Accurate results are only possible if the mechanic possesses a feel for using the tool. Heavy-handed use of measuring tools produces less accurate results. Hold the tool gently by the fingertips to easily feel the point at which the tool contacts the object. This feel for the equipment produces more accurate measurements and reduces the risk of damaging the tool or component. Refer to the following sections for specific measuring tools.

Feeler Gauge



Use feeler or thickness gauges (**Figure19**) for measuring the distance between two surfaces.
A feeler gauge set consists of an assortment of steel strips of graduated thickness. Each blade is marked with its thickness. Blades can be of various lengths and angles for different procedures.
A common use for a feeler gauge is to measure valve clearance. Use wire (round) type gauges to measure spark plug gap.

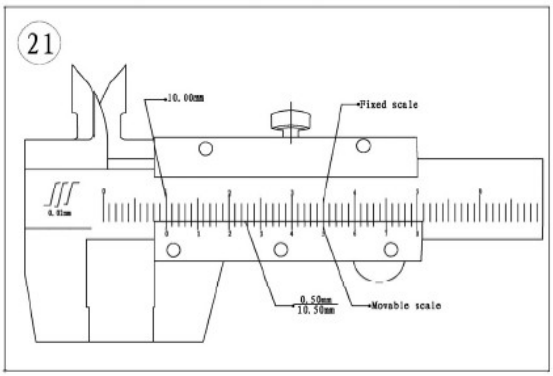
Calipers



Calipers (**Figure 20**) are excellent tools for obtaining inside, outside and depth measurements. Although not as precise as a micrometer, they allow reasonable precision, typically to within 0.05 mm (0.001 in.). Most calipers have a range up to 150 mm (6 in.).

Calipers are available in dial, venire or digital versions. Dial calipers have a dial readout that provides convenient reading. Venire calipers have marked scales that must be compared to determine

the measurement. The digital caliper uses a liquid-crystal display (LCD) to show the measurement. Properly maintain the measuring surfaces of the caliper. There must not be any dirt or burrs between the tool and the object being measured. Never force the caliper to close around an object. Close the caliper around the highest point so it can be removed with a slight drag. Some calipers require calibration. Always refer to the manufacturer's instructions when using a new or unfamiliar caliper.



To read a vernire. Calipers refer to **Figure 21**. The fixed scale is marked in l-mm increments. Ten individual lines on the fixed scale equal 1 cm. The movable scale is marked in 0.05 mm (hundredth) increments. To obtain a reading, establish the first number by the location of the 0 line on the movable scale in relation to the first line to the left on the fixed scale. In this example, the number is 10 mm. To determine the next number, note which of the lines on the movable scale align with a mark on the fixed scale. A number of lines will seem close, but only one will align exactly. In this case, 0.50 mm is the reading to

add to the first number. Adding 10 mm and 0.50 mm equals a measurement of 10.50 mm.

Micrometers

A micrometer is an instrument designed for linear measurement using the decimal divisions of the inch or meter (**Figure 22**). While there are many types and styles of micrometers, most of the

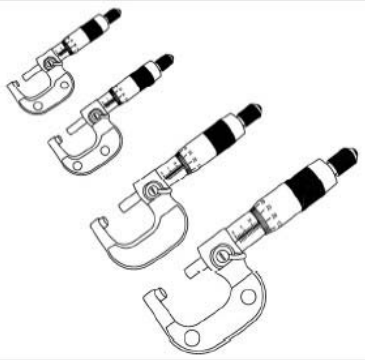
22

DECIMAL PLACE VALUES*

0.1	Indicates 1/10 (one tenth of an inch or millimeter)
0.01	Indicates 1/100 (one one-hundredth of an inch or millimeter)
0.001	Indicates 1/1000 (one one-thousandth of an inch or millimeter)

*This chart represents the values of figures placed to the right of the decimal point. Use it when reading decimals from one-tenth to one one-thousandth of an inch or millimeter. It is not a conversion chart (for example: 0.001 in. is not equal to 0.001 mm).

23



procedures in this manual call for an outside micrometer. Use the outside micrometer to measure the outside diameter of cylindrical forms and the thickness of materials.
A micrometer's size indicates the minimum and maximum size of a part that it can measure. The usual sizes (**Figure 23**) are 0-25mm (0-1 in.), 25-50 mm (1-2 in.), 50-75 mm (2-3 in.) and 75-100 mm (3-4 in.). Micrometers that cover a wider range of measurements are available. These use a large frame with interchangeable anvils of various lengths. This type of micrometer offers a cost savings, but its overall size may make it less convenient.
When reading a micrometer, numbers are taken from different scales and added together. The following sections describe how to adjust, care for and read the measurements of various types of outside micrometers.
For accurate results, properly maintain the measuring surfaces of the micrometer. There cannot be any dirt or burrs between the tool and the measured object. Never force the micrometer to close around an object. Close the micrometer around the highest point so it can be removed with a slight drag.

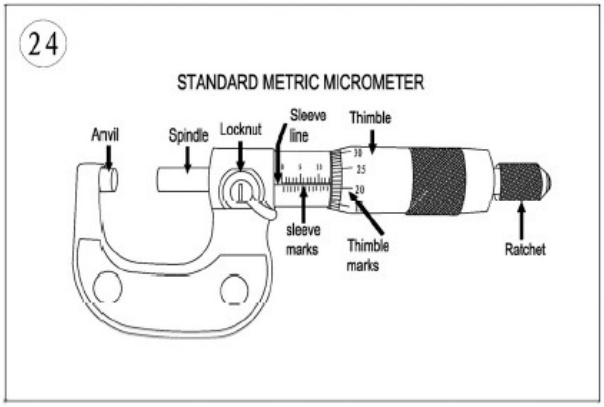
Adjustment

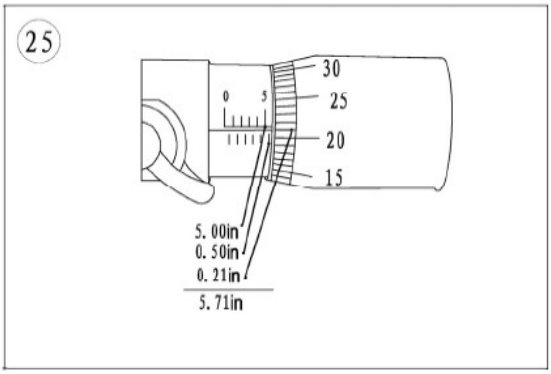
Before using a micrometer, check its adjustment as follows:
1. Clean the anvil and spindle faces.
2A. To check a 0-1 in. or 0-25 mm micrometer:
a. Turn the thimble until the spindle contacts the anvil. If the micrometer has a ratchet stop, use it to ensure that the proper amount of pressure is applied.
b. If the adjustment is correct, the 0 mark on the thimble will align exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.

c. Follow the manufacturer's instructions to adjust the micrometer.
2B. To check a micrometer larger than 1 in. or 25 mm use the standard gauge supplied by the manufacturer. A standard gauge is a steel block, disc or rod that is machined to an exact size.
a. Place the standard gauge between the spindle and anvil, and measure its outside diameter or length. If the micrometer has a ratchet stop, use it to ensure that the proper amount of pressure is applied.
b. If the adjustment is correct, the 0 mark on the thimble will align exactly with the 0 mark on the sleeve line. If the marks do not align, the micrometer is out of adjustment.
c. Follow the manufacturer's instructions to adjust the micrometer.

Care

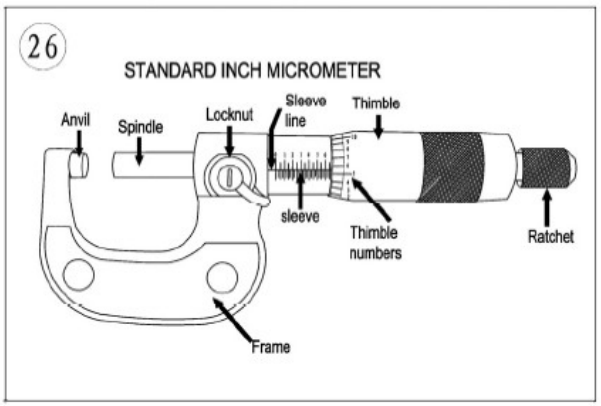
Micrometers are precision instruments. They must be used and maintained with great care. Note the following:
1. Store micrometers in protective cases or separate padded drawers in a tool box.
2. When in storage, make sure the spindle and anvil faces do not contact each other or another object. If they do, temperature changes and corrosion may damage the contact faces.
3. Do not clean a micrometer with compressed air. Dirt forced into the tool will cause wear.
4. Lubricate micrometers with WD-40 to prevent corrosion.





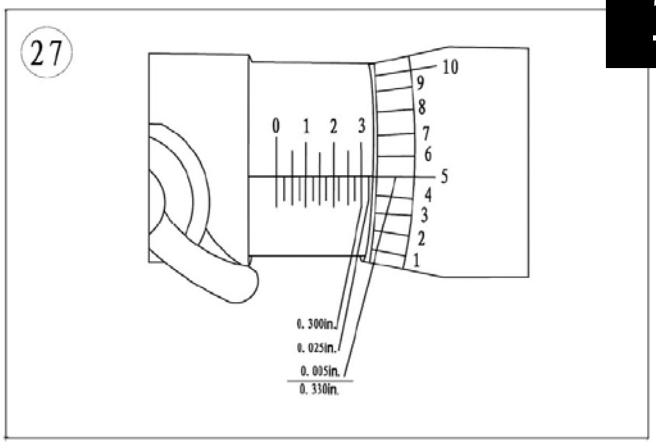
Metric micrometer

The standard metric micrometer (**Figure 24**) is accurate to one one-hundredth of a millimeter (0.01 mm). The sleeve line is graduated in millimeter and half millimeter increments. The marks on the upper half of the sleeve line equal 1.00 mm. Each fifth mark above the sleeve line is identified with a number. The number sequence depends on the size of the micrometer. A 0-25 mm micrometer, for example, will have sleeve marks numbered 0 through 25 in 5 mm increments. This numbering sequence continues with larger micrometers. On all metric micrometers, each mark on the lower half of the sleeve equals 0.50mm. The tapered end of the thimble has 50 lines marked around it. Each mark equals 0.01 mm. One completer turn of the thimble aligns its 0 mark with the first line lower half of the sleeve line or 0.50mm.



When reading a metric micrometer, add the number of millimeters and half-millimeters on the sleeve line to the number of one one-hundredth millimeters on the thimble. Perform the following

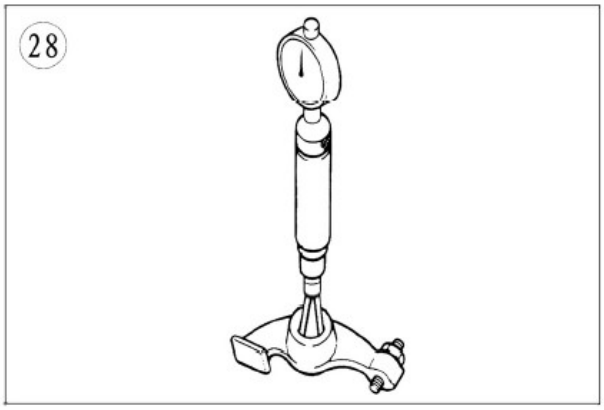
steps
while referring to **Figure 25**.
1. Read the upper half of the sleeve line and count the number of lines visible. Each upper line equals 1mm.
2. See if the half –millimeter line is visible on the lower sleeve line. If so, add 0.50mm to the reading in Step 1.
3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01mm.

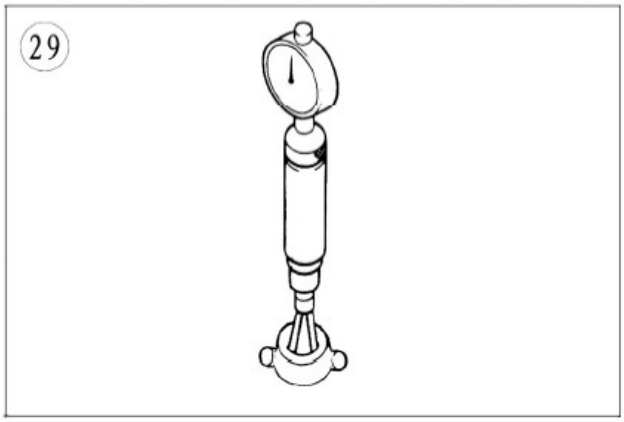


NOTE:
If a thimble mark does not align exactly with the sleeve line. Estimate the amount between the lines. For accurate readings in two-thousandths of a millimeter (0.002mm), use a metric vernier micrometer.
4. Add the readings from Steps 1-3.

Standard inch micrometer

The standard inch micrometer (**Figure 26**) is accurate to one-thousandth of an inch or 0.001. The sleeve is marked in 0.025 in. increments. Every fourth sleeve mark is numbered 1,2,3,4,5,6,7,8,9. These numbers indicate 0.100, 0.200, 0.300, and so on. The tapered end of the thimble has 25 lines marked around it. Each mark equals 0.001 in. One complete turn of the thimble will align its zero mark with the first mark on the sleeve or 0.025 in.

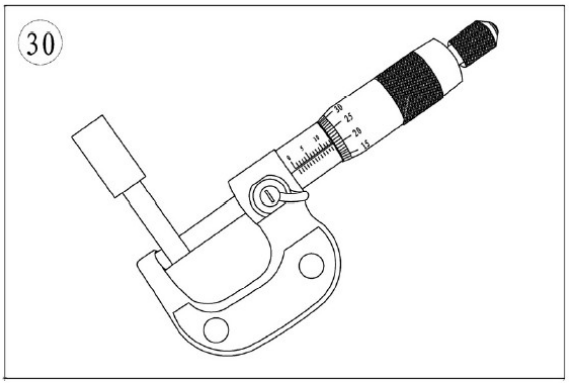




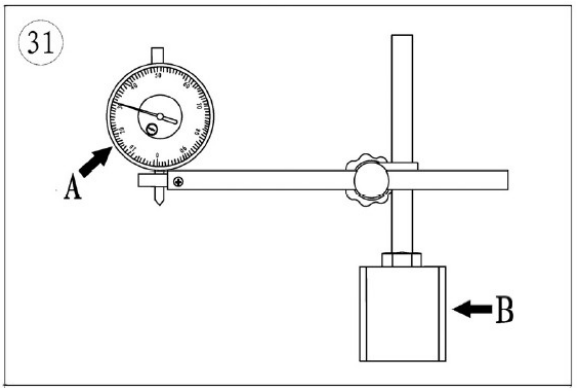
To read a standard inch micrometer, perform the following steps and refer to **Figure 27**.
1. Read the sleeve and find the largest number visible. Each sleeve number equals 0.100 in.
2. Count the number of lines between the numbered sleeve mark and the edge of the thimble. Each sleeve mark equals 0.025 in.
3. Read the thimble mark that aligns with the sleeve line. Each thimble mark equals 0.01 in.

NOTE:
If a thimble mark does not align exactly with the sleeve line, estimate the amount between the lines. For accurate readings in ten-thousandths of an inch (0.0001 in), use a vernier inch micrometer.
4. Add the readings from Steps 1-3.

Telescoping and Small Bore Gauges

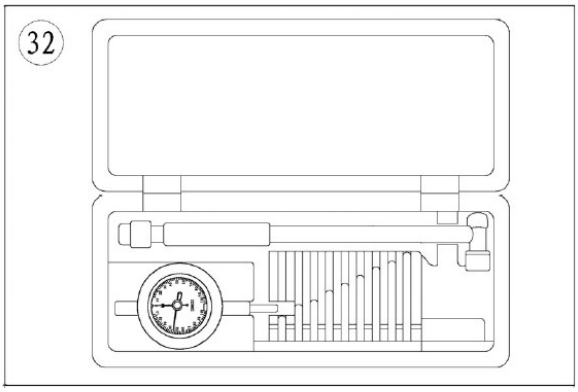


Use telescoping gauges (**Figure 28**) and small bore gauges (**Figure 29**) to measure bores. Neither gauge has a scale for direct readings. Use an outside micrometer to determine the reading.
To use a telescoping gauge, select the correct size gauge for the bore. Compress the movable post and. Care fully insert the gauge into the bore. Carefully move the gauge in the bore to make sure it is centered. Tighten the knurled end of the gauge to hold the movable post in position. Remove the gauge and measure the length of the posts. Telescoping gauges are typically used to measure cylinder bores.
To use a small bore gauge, select the correct size gauge for the bore. Carefully insert the gauge into the bore. Tighten the knurled end of the gauge to carefully expand the gauge fingers to the limit within the bore. Do not over tighten the gauge because there is no built-in release. Excessive tightening can damage the bore surface and damage the tool. Remove the gauge and measure the outside dimension (**Figure 30**). Small bore gauges are typically used to measure valve guides.

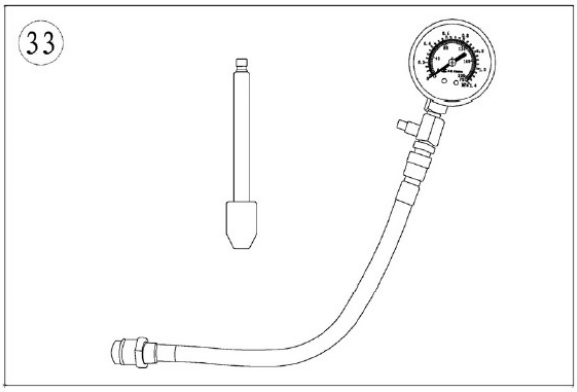


Dial Indicator:

A dial indicator (**Figure 31**) is a gauge with a dial face and needle used to measure variations in dimensions and movements. Measuring brake rotor runout is a typical use for a dial indicator.
Dial indicators are available in various ranges and graduations and with three basic types of mounting bases: magnetic (B. **Figure 31**). Clamp, or screw-in stud. When purchasing a dial indicator, select on with a continuous dial (A, **Figure 31**).

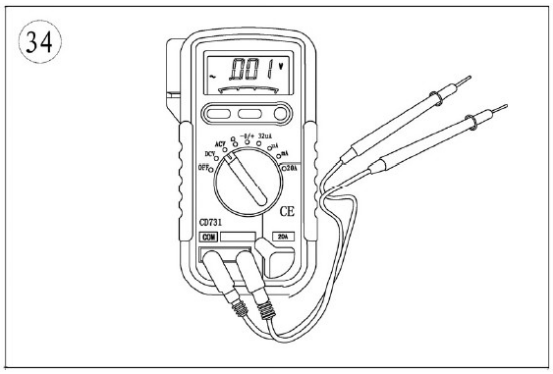


Cylinder Bore Gauge
A cylinder bore gauge is similar to a dial indicator. The gauge set shown in **Figure 32** consists of a dial indicator, handle, and different length adapters (anvils) to fit the gauge to various bore sizes. The bore gauge is used to measure bore size, taper and out-of-round. When using a bore gauge, follow the manufacturer's instructions



Compression Gauge

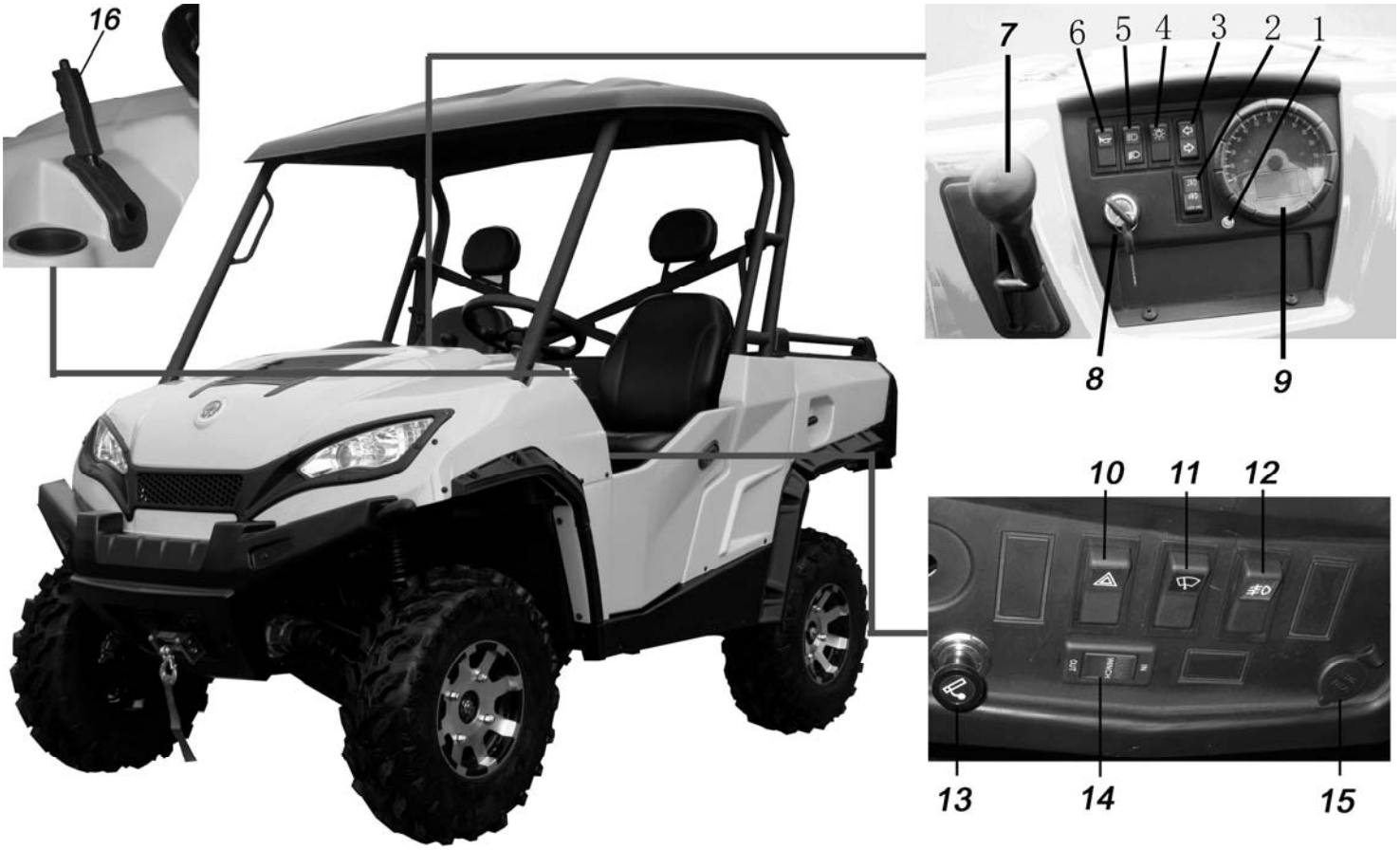
A compression gauge **(Figure 33**) measures combustion chamber (cylinder) pressure, usually in PSI or kg/ cm2 . The gauge adapter is either inserted or screwed into the spark plug hole to obtain the
reading. Disable the engine so it does not start and hold the throttle in the wide-open position when performing a compression test An engine that does not have adequate compression cannot be properly tuned. Refer to Chapter Three.



Multimeter

A multimeter **(Figure 34)** is an essential tool for electrical system diagnosis. The voltage function indicates the voltage applied or available to various electrical components. The ohmmeter function tests circuits for continuity, or lack of continuity, and measures the resistance of a circuit.
Some manufacturer's specifications for electrical components are based on results using a specific test meter. Results may vary if using a meter not recommended by the manufacturer. Such requirements are noted when applicable.
Ohmmeter (analog) calibration
Each time an analog ohmmeter is used or if the scale is changed, the ohmmeter must be calibrated.
Digital ohmmeters do not require calibration.
1. Make sure the meter battery is in good condition.
2. Make sure the meter probes are in good condition.
3. Touch the two probes together and observe the needle location on the ohms scale. The needle must Align with the 0 mark to obtain accurate measurements.
4. If necessary, rotate the meter ohms adjust knob until the needle and 0 mark align.

Description and vehicle identification

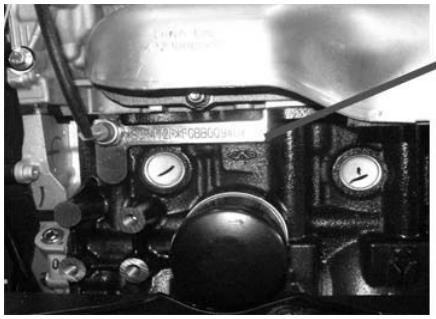


1. Meter adjust button 2. Driver model turn switch 3. Turning switch
4. Light switch 5. Low beams/High beams turn 6. Horn switch
7. Gear Selector 8. Ignition Switch 9. Meter
10. Warning indicator light switch 11. Wiper switch(optional)
12. Spot light(optional) 13. Cigarette lighter 14. winch switch(optional)
15. Auxiliary DC jack(12V 120W/10A)

Identification number records

Record the vehicle identification number and engine number in the spaces provided for assistance when ordering spare parts from your dealer or for reference in case the vehicle is stolen.

VIN NUMBER



ENGINE NUMBER

Vehicle Identification Number(1100UE): LCXRSAS3~
Vehicle Identification Number(1100UEL): LCXLSAS3~
Engine Number: SQR472F

NOTE: The vehicle identification number is used to identify your machine.

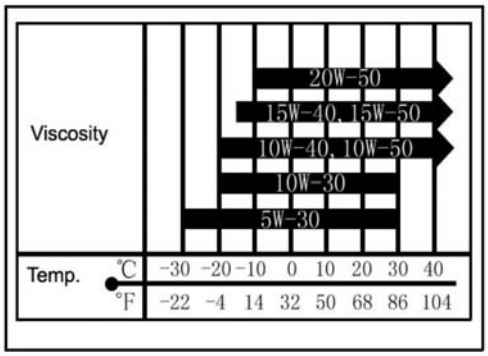
Main Data Table

Item		Parameter
Model		1100UE/1100UEL
Length		2830mm/3630mm
Width		1640mm/1640 mm
Height		2130mm/2130mm
Wheel base		1830mm/2630mm
Engine type		SQR472F
Displacement		1083ml
Fuel type		Unleaded gasoline 93octane or above
Mass of whole equipments (Not include driver)		711kg/800 kg
Number of Passengers		2 for 1100UE, 4 for 1100UEL(including driver)
Max. Load		300Kg
Tire	Front	26x9-14
	Rear	26x11-14
Minimum turning radius		4500mm/5000mm
Engine	Start-up mode	Electric starter
	Type	in-line Vertical, four-cylinder, water-cooled, DOHC
	Combustion Chamber Type	Tent-shaped
	Bore × stroke	72×66.5 mm (2.83×2.62 in)
	Compression ratio	9.5:1
	Lubrication Type	Compound (pressure, splash lubrication)
	Cool type	Mandatory cycle of antifreeze-coolant
	Maximal power.	50Kw/6000 rpm(EEC model less than 15kw)
	Max. torque	90N.M/3500~4000 rpm(EEC model:45N.M/2240 rpm)
	Lowest fuel consuming rate (g/Kw·h)	≤ 275g/Kw · h
	Idling speed (r/min)	850±50 r/min
	Starting Performance	The engine should be started smoothly in 30S without any special measure when the air temperature is -25℃.Start test is allowed to start three times continuously as a row. It can be restarted in 2 minutes later after the first failure.
	The direction of camshaft rotary motion	clockwise（From the front-end look at the engine crankshaft pulley）
	Spark plug	K6RTG
	Generators	14V75A whole-alternator
	Lubricating oil category	API SF SAE 10W/30
	Engine oil pump type	Rotor Style
	Oil filter type	As a whole mounted rotating
	Fuel supply	EFI

Item			Parameter
Engine/ Gearing	Fuel type		93 unleaded gasoline high cleanliness
	Transmission		V-belt with teeth on, auto stepless gear change, plus gear change cam with change gear transmission
	Gear change type		gear lever with hand
	Clutch type		wet, hoof centrifugal type
	Primary speed change ratio (stepless speed change)		0.84—3.28
	Speed change ratio：		Total speed reduce ratio
	H Gear: 2.66		2.23—8.72
	L Gear: 5.527		4.64—18.13
	R Gear: 6.80		5.71—22.30
	Cooling style		Closed cooling fluid circulating
	Cooling fluid type		antifreeze with prevent rust
	Out dimension		555.8 x 455.9 x 699
	Net weight		80kg
	Output type		front and rear shaft output
	Shaft running direction		counter-clockwise (from back of engine).
Steering device	Steering angle	Right	40°
		Left	40°
Brake type		Front	Hydraulic Disc
		Rear	Hydraulic Disc
Bumper Device	Suspension		Swing Arm
Frame type			Welded steel tube and plate

Overhaul Datasheet
Lubricating device

Item		**Standard**	**Service limit**
Oil pump Rotor	Gap between inner and outer rotors	0.05~0.18mm	0.35mm
	Gap between rotor and body	0.10～0.181mm	0.25mm
Engine Oil Capacity	Volume when replacing	3500ml	—
	Full capacity	3600ml	—

Recommended Oil (see original)  	● Specially for 4-stroke motorcycle SAE-10W-40、20W-50 Substitutes must be used in the following range. ●API type: SE or SF grade ●SAE type: Choose from the left chart according to the environmental temperature	

Cooling Device

Item		Standard
Coolant capacity	Full Capacity	4500ml
	Reservoir tank capacity	3300 ml
	Standard Density	50%
Opening pressure of radiator cap		108kpa(1.1kgf/cm^2)
Thermostat	Temperature / valve open	72±2 °C
	Temperature/valve full open	88 °C
	Overall lift	3.5-4.5mm/95°C

Front/Rear Wheel

Item			Standard	Service Limit
Front Wheel	Play of wheel rim	Vertical	1.0mm	2.0mm
		Horizontal	1.0mm	2.0mm
	Tire	Groove	—	3.0mm
		Pressure	12PSI(83KPa)	±0.5PSI(±3.5KPa)
Rear Wheel	Play of wheel rim	Vertical	1.0mm	2.0mm
		Horizontal	1.0mm	2.0mm
	Tire	Groove	—	3.0mm
		Pressure	12PSI(83KPa)	±0.5PSI(±3.5KPa)

Brake System

Item		Standard	Service Limit
Front brake	Brake Pedal Play	0mm	--
	Brake disc thickness	4mm	3mm
Rear brake	Brake Pedal Play	0mm	--
	Brake disc thickness	4mm	3mm

Battery、Charging System

Item			**Standard**
AC magneto Motor	Model		Permanent magnet AC type
	Output		3- phase AC
	Charging coil Resistance (20℃)		0.2-0.3Ω
Rectifier	Three-phase annular rectification, Silicon controlled parallel-connected regulated voltage		
Battery	Capacity		12V36Ah
	Terminal point voltage	Fully charged	12.8V
		Insufficient charge	<11.8V
	Charging current/time	Standard	0.9A/5~10H
		Quick	4A/1H

Ignition system

Item		Standard
Ignition		ECU ignition
Spark Plug	Type	K6RTG (NGK)
	Optional	---
	Spark plug gap	0.9-1.1mm

Screwing moment of important bolts

FRONT, REAR SUSPENSION:

S.Q.	ITEM	THREAD DIAMETER	QTY.	TORQUE（N·m）	REMARK
1	FRONT/REAR SHOCK ABSORBER	M10×1.25×50	8	30~40	
2	FRONT BRAKE DISK	M10×25	8	40~50	
3	REAR BRAKE DISK	M10×25	8	40~50	
4	RUBBER WASHER OF ENGINE	M10×1.25	8	40~50	
5	ENGINE SUPPORT A	M10×25	4	40~50	
6	ENGINE SUPPORT B	M10×1.25	2	40~50	
7	CVT DRIVER	M12×175	1	40~50	
8	CVT SECONDARY SHEAVE	M10×115	1	40~50	
9	FRONT LOWER/ UPPER ARM	M10×1.25×90	8	40~50	
10	JOINT,ARM BALL	M10×1.25	2	40~50	
11	REAR LOWER/ UPPER ARM	M10×1.25×90	8	40~50	
12	FRONT/REAR AXLE NUT	M18	4	180~200	
13	STEERING WHEEL	M5×15	6	10	
14	STEERING SHAFT	M8×25	4	20~30	
15	FRONT AXLE	M10×1.25×145	1	40~50	
16	FRONT AXLE	M10×1.25×85	1	40~50	
17	HOLDER,FRONT AXLE(FR/RR)	M8×16	6	20~30	
18	REAR AXLE	M12×1.25×115	2	40~50	
19	HOLDER,REAR AXLE(FR/RR)	M8×16	6	20~30	
20	FRONT DRIVE SHAFT	M8×25	4	20~30	
21	REAR DRIVE SHAFT/ PARKING DISC	M8×30	4	20~30	
22	COUPLING FLANGE, REAR DRIVE SHAFT	M14×1.25	1	90~100	
23	SUPPORT,PARKING CALIPER	M8×45	3	20~30	
24	HOLDER，BRAKE AND THROTTLE	M10×1.25×25	4	40~50	
25	FRONT/REAR BRAKE CALIPER	M10×1.25	8	40~50	

26	HANDLE BRAKE	M8	3	20~30	
27	NUT , WHEEL	M12×1.25	16	40~50	

	Specification	Tightening moment
Other screws （ 8.8 grade ）	M6	10N·m
	M8	25N·m
	M10	50N·m
	M12	80N·m

Specification and usage quantity for fuel

Lubricating oil and brake liquid

Category	Specification	Capacity	Remark
Fuel	RQ-93or upper grade lead-free gasoline	35L	
Lubricating oil（engine, Gear box）	SAE15W—40/SF or SC	3600ml(change oil) 3500ml(change filter)	
Gearbox		Front :500ml	
		Rear :1300ml	
Lubricating oil （ front main driver）	SAE80W—90/GL-4	Change 0.25L	
Lubricating oil (Rear main driver）		Change 0.18L	
Brake liquid	GB1083 JG3	0.5L	
Engine coolant	Distilled water: Glycol =1:1		Extremely cold area，Distilled water: Glycol =2:3

Overhaul info……2-1
Troubleshooting……2-1
Steering wheel & platfond ……2-2
Windshield assembly……2-3
Side door……2-4
Triangular cover & rear board……2-5
Seat belt & main protect pole assy……2-6
Front bumper……2-9
Front line cover & front air guide cover assy…2-10
Front cover assy……2-11
Cargo box……2-13
Muffler……2-16

Overhaul Information

Operation Cautions

Warning

Gasoline is highly flammable, therefore smoke and fire are strictly forbidden in the work place. Special attention should also be paid to sparks. Gasoline may also be explosive when it is vaporized, so operation should be done in a well-ventilated place.
Remove and Install muffler after it is fully cold.

● This chapter is on the disassembly and installation of rack, visible parts, exhaust pipe, Muffler and fuel tank.
● Hoses, cables and wiring should be routed properly
● Replace the gasket with a new one after muffler is removed
● After muffler is installed, check if there is any exhaust leakage.

Tightening torque

Muffler Exhaust Pipe Nut: 40-50N.m

Troubleshooting

Loud exhaust noise
● Broken muffler
● Exhaust leakage
Insufficient power
● Distorted muffler
● Exhaust leakage
● Muffler clogged

Cover, steering wheel

Remove

Exert upward to separate cover, steering Wheel.

Installation

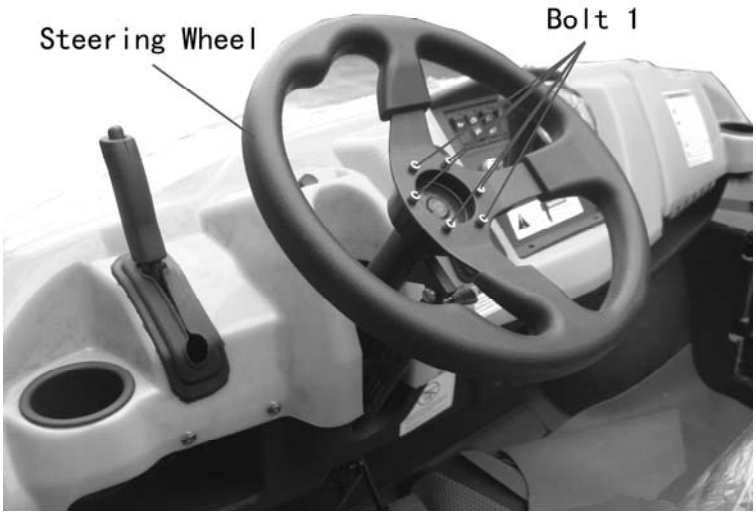
Reverse the removal procedure for Installation

Steering wheel

Remove

Remove six bolts 1

Remove steering wheel



Installation

Note

Align the front wheel first, and then adjust steering wheel;

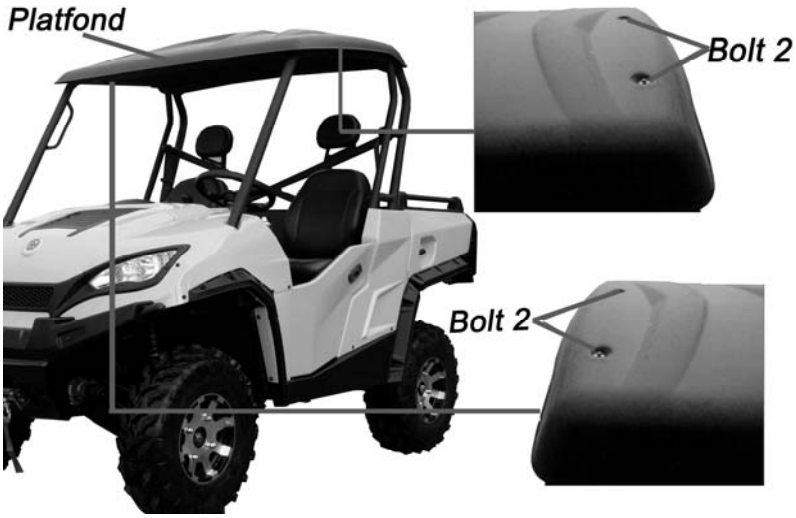
Reverse the removal procedure for Installation

Platfond

Remove

Remove four bolts 2

Remove platfond



Installation

Reverse the removal procedure for Installation

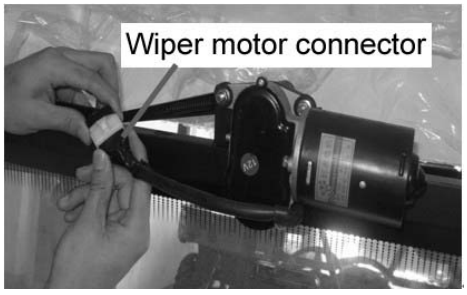
Windshield Assembly

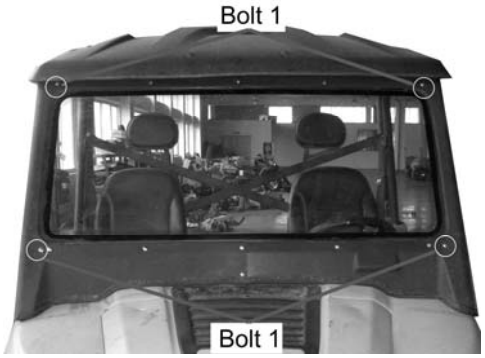
Remove

Separate the connector of wiper motor.

Remove four bolts 1.

Remove windshield assembly.

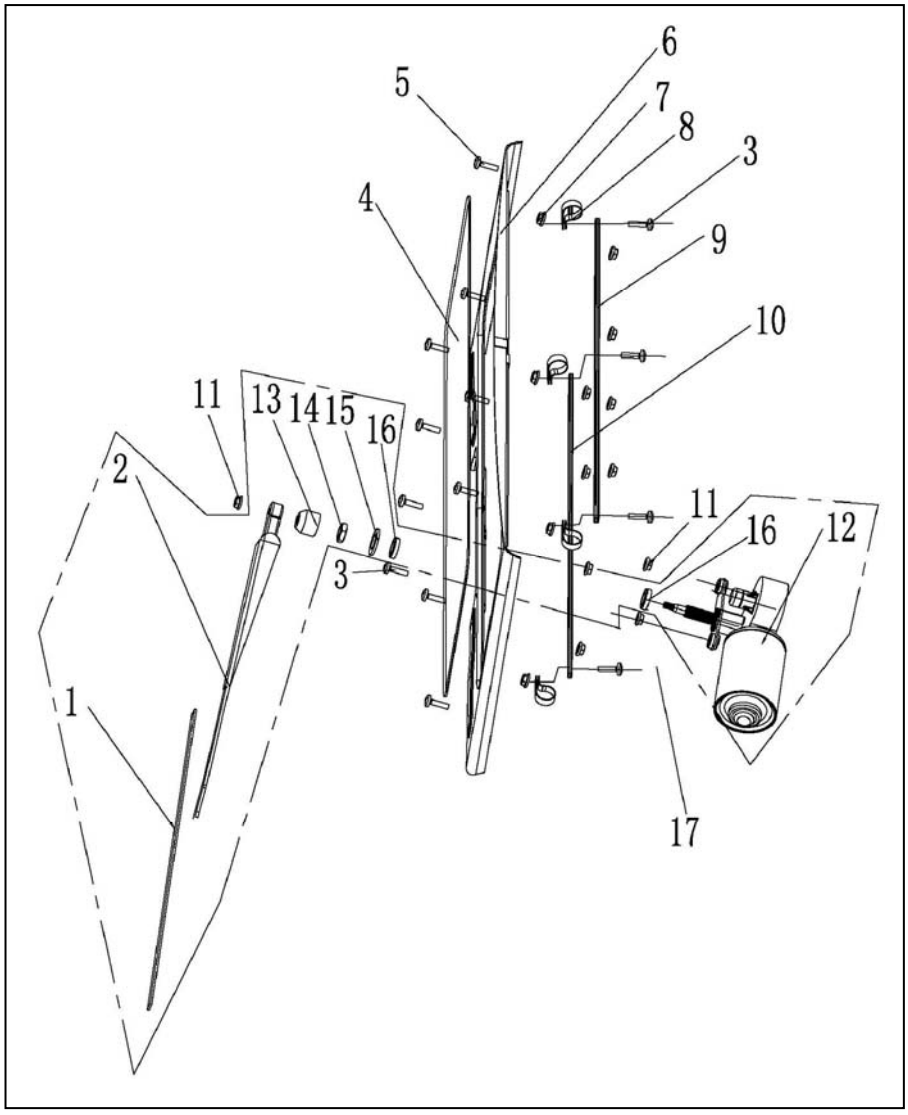




Installation

Reverse the removal procedure for Installation

1. WIPER BLADE
2. WIPER ARM
3. BOLT(M6×20）
4. WINDSHIELD SCALEBOARD
5. BOLT(M6×16）
6. FARDAGE WINDSHIELD
7. CAP NUT (M6)
8. HOOP (Φ45)
9. WINDSHIELD IMMOBILITY PLANK（TOP）
10. WINDSHIELD IMMOBILITY PLANK（BELOW）
11. NUT，FLANGE(M6)
12. WIPER
13. DUST COVER, RUBBER
14. NUT (M12)
15. WASHER (Φ12)
16. RUBBER WASHER
17. WIPER ASSY

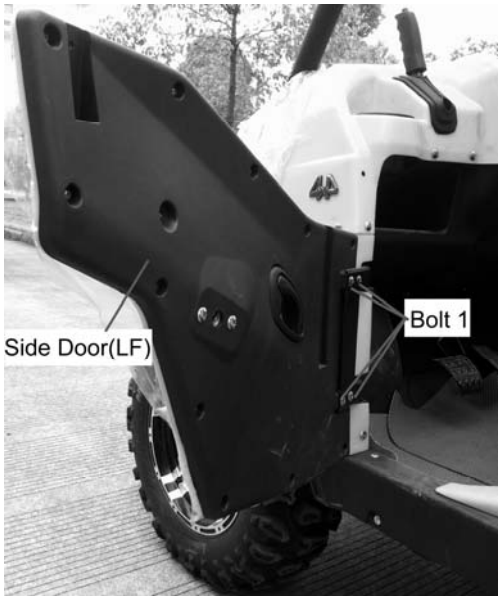


Side door (LF)

Remove

Remove bolt 1

Remove side door (LF)
Remove the side door of the another side in the above way.



Installation

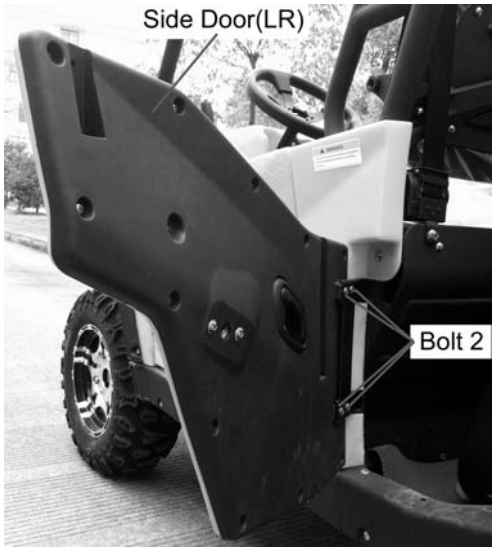
Reverse the removal procedure for Installation.

1100UEL：Side door (LR)

Remove

Remove bolt 2

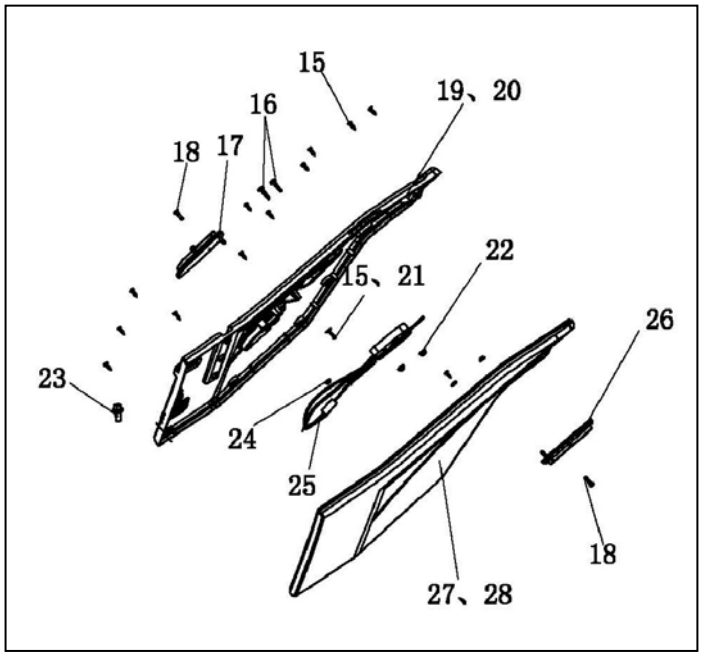
Remove side door (LR)
Remove the side door of the another side in the above way.



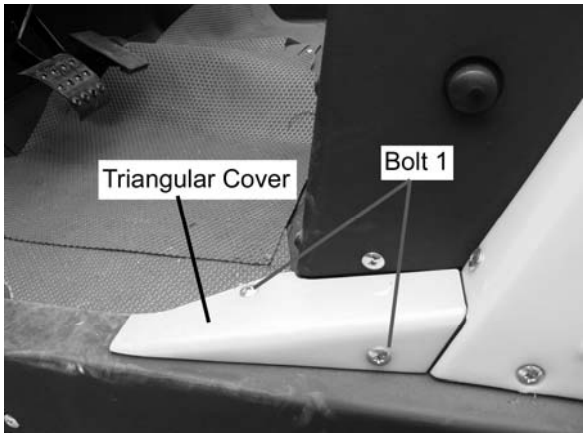
Installation

Reverse the removal procedure for installation

15. TAPPING SCREW (ST 4.2×20)
16. SCREW (M6×25)
17. HANDLE, HALF DOOR (L)
18. SCREW (M5×20)
19. INNER HALF DOOR (L)
20. INNER HALF DOOR (R)
21. WASHER (Φ5×Φ10×1)
22. BOLT FLANGE (M6)
23. BOLT FLANGE (M6×16)
24. BOLT FLANGE (M5)
25. CABLE, HALF DOOR
26. HANDLE, HALF DOOR(R)
27. OUTER HALF DOOR (L)
28. OUTER HALF DOOR (R)



Triangular Cover



Remove

Remove bolt 1

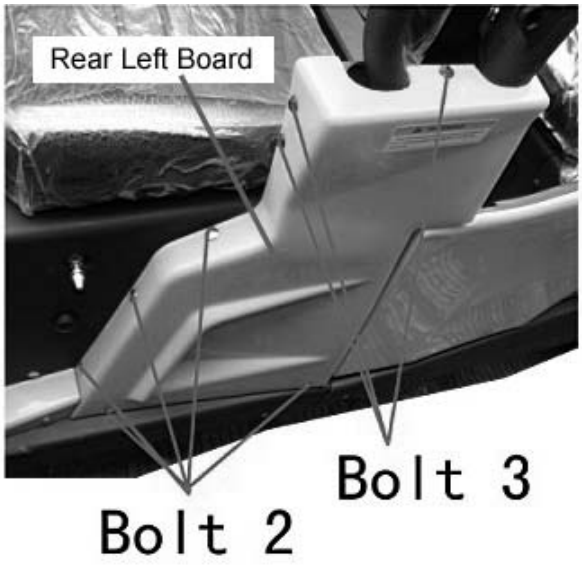
Remove triangular cover

Remove the triangular cover of the another side in the above way.

Installation

Reverse the removal procedure for installation.

Rear Left Board



Remove

Remove bolt 2

Remove bolt 3

Remove rear left board.

Remove the rear right board in the above way.

Installation

Reverse the removal procedure for Installation.

Seat belt

Remove

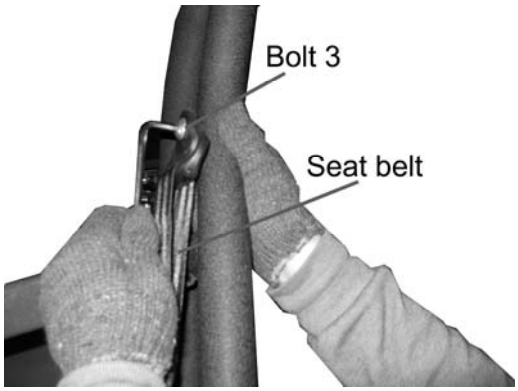
Remove bolt 3

Remove bolt 4

Remove driver seat belt.

Remove the passenger seat belt in the above way.

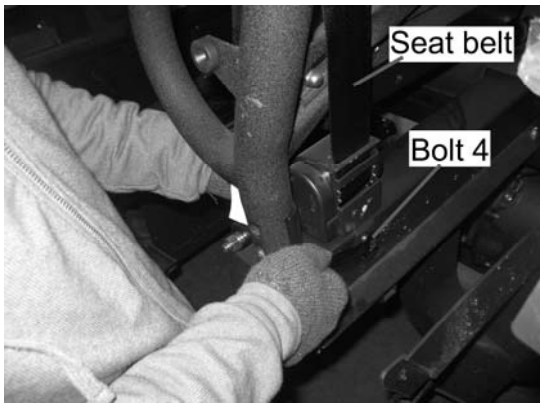
Remove rear seat belt of passenger in same method.



Installation

Reverse the removal procedure for Installation.

Install rear seat belt of passenger in same method.



Main Protect Pole ASSY

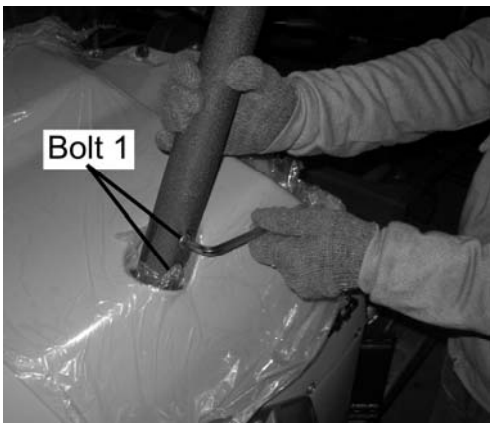
Remove

Remove bolt 1

Remove bolt 2

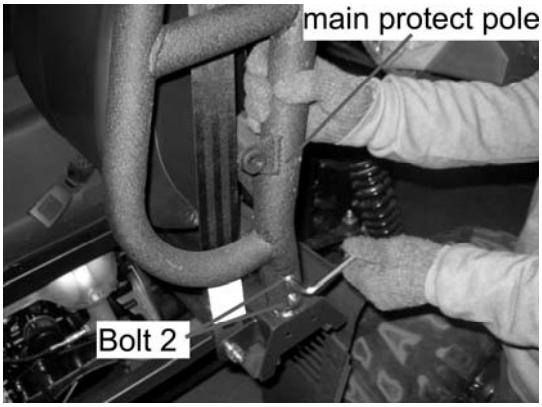
Remove the main protect pole assy of the another side in the above way.

Remove main protect pole assy.

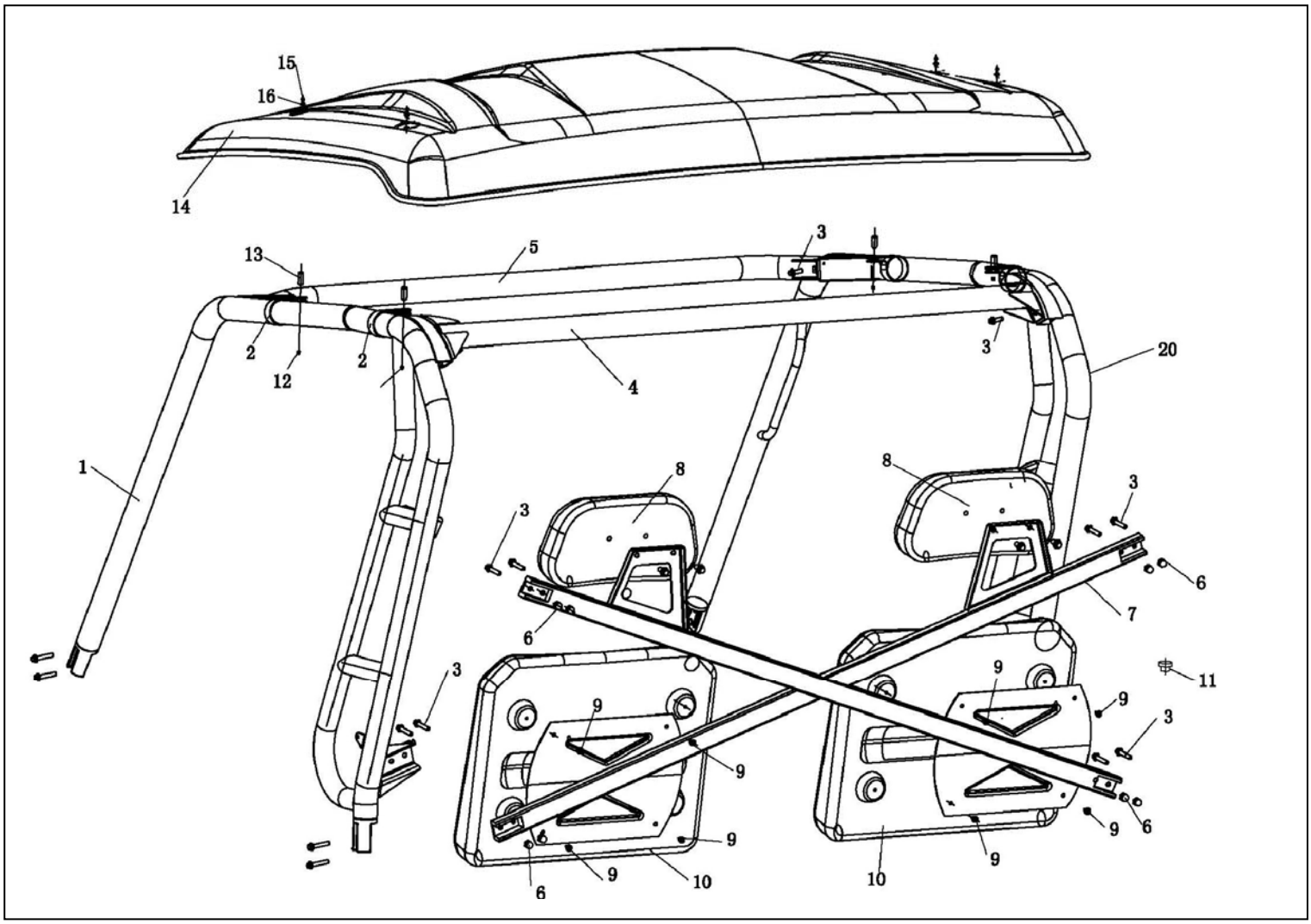


Installation

Reverse the removal procedure for Installation.



XY1100UE:



1. FRONT PROTECT POLE ASSY (L)
2. HOOP (Φ45)
3. BOLT，FLANGE（M8×16）
4. REAR THWARTWISE PIPE
5. FRONT BENT PIPE
6. CAP NUT (M8)
7. BACKREST PIPE
8. HEADREST
9. SCREW (M5×20)
10. BACKREST
11. RUBBER，STORE BOX
12. CAP NUT(M6)
13. CENTER SPACER, HOOP
14. PLATFOND
15. BOLT，FLANGE（M6×55）
16. WASHER(Φ6×Φ12×2)
17. BOLT (M10×30)
18. LOCK CATCH, SAFETY BELT
19. SAFETY BELT ASSY
20. FRONT PROTECT POLE ASSY(R)

XY1100UEL:

1.FRONT PROTECT POLE ASSY(L)

2. HOOP(φ45)

3. BOLT，FLANGE（M8×16）

4. REAR THWARTWISE PIPE

5. FRONT BENT PIPE

6. CAP NUT(M8)

7. BACKREST PIPE

8. HEADREST

9. SCREW(M5×20)

10. BACKREST

11. RUBBER，STORE BOX

12. CAP NUT(M6)

13. CENTER SPACER, HOOP

14. CEILING

15. BOLT，FLANGE（M6×55）

16. WASHER (φ6×φ12×2)

17. BOLT(M10×30)

18. LOCK CATCH, SAFETY BELT

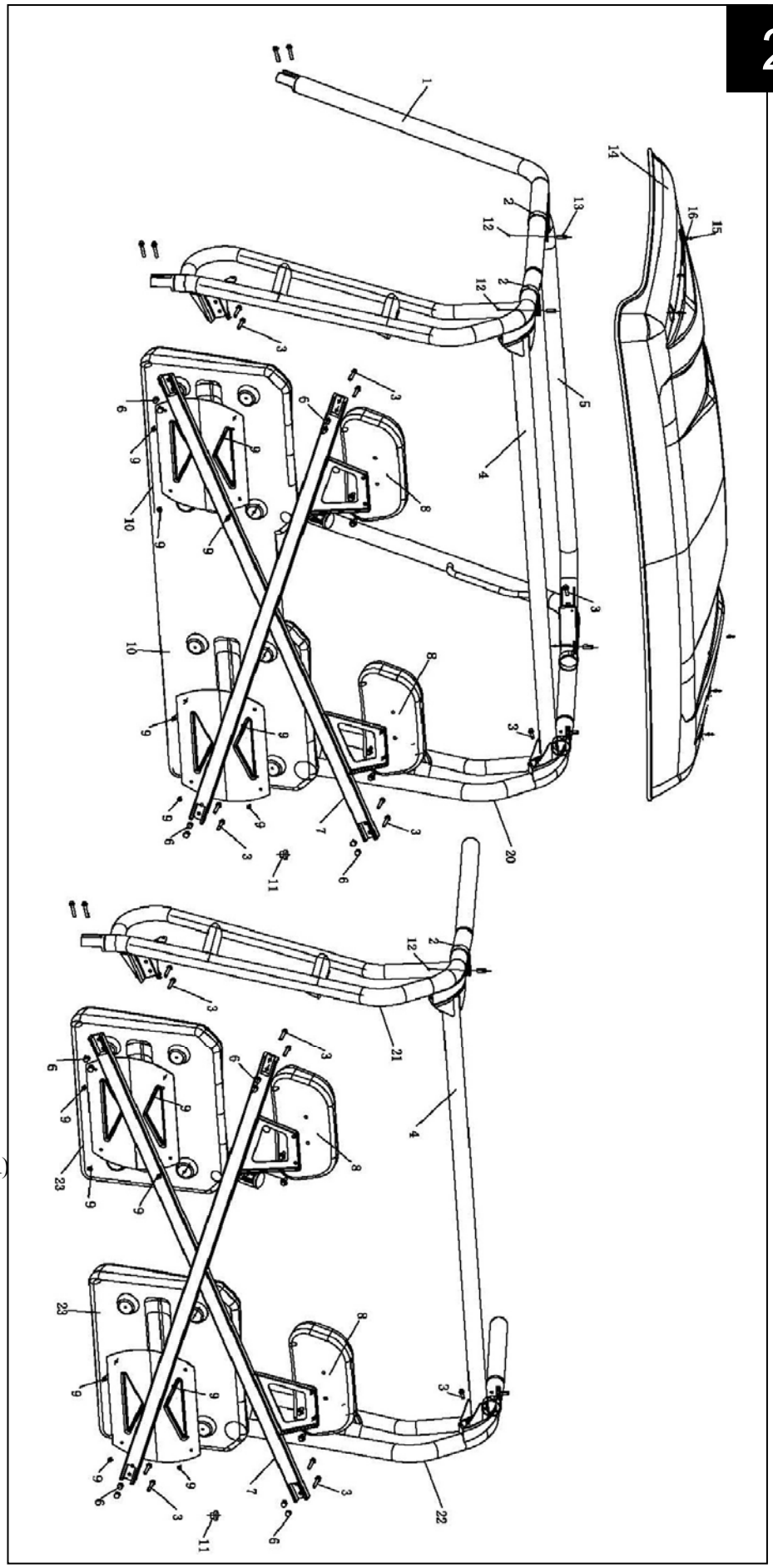
19. SAFETY BELT ASSY

20. FRONT PROTECT POLE ASSY(R)

21. REAR PROTECT POLE ASSY(L)

22. REAE PROTECT POLE ASSY(R)

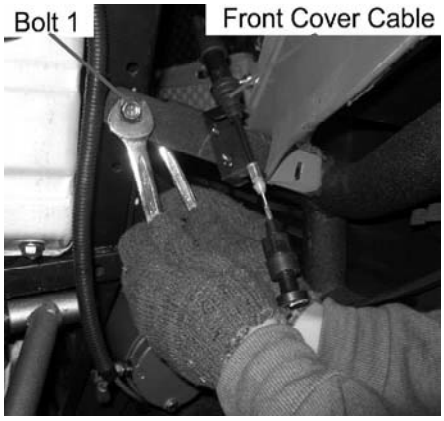
23. BACKREST

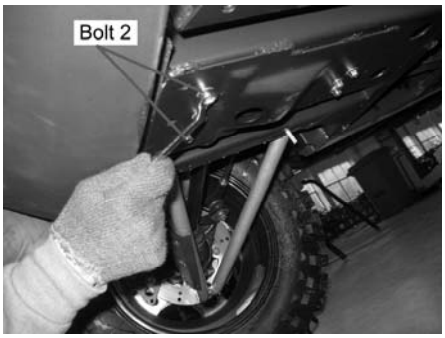


Front Bumper

Remove

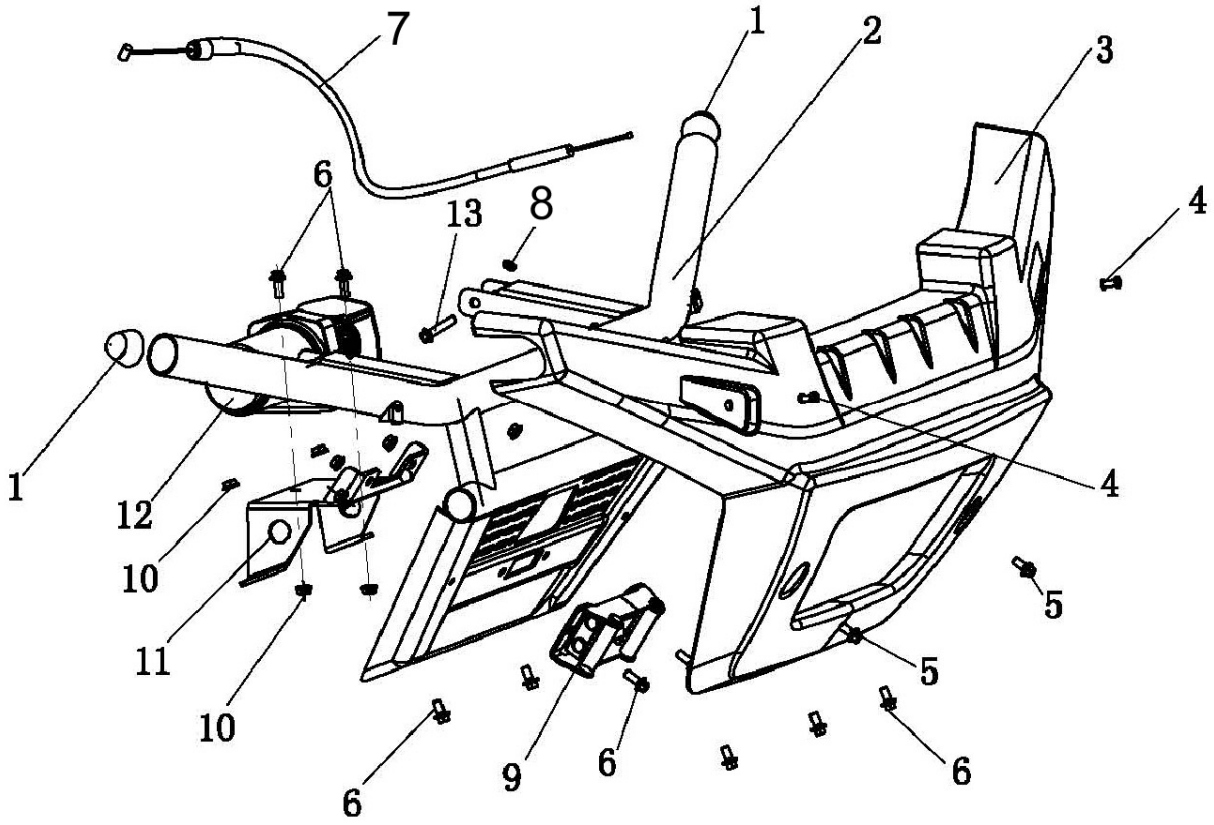
Remove bolt 1
Remove front cover cable.
Remove bolt 2
Remove front bumper





Installation

Reverse the removal procedure for Installation.



1. COBBRA，BUMPER
2. FRONT BUMPER
3. DECORATE COVER, FRONT BUMPER
4. SCREW（M6×20）
5. BOLT,FLANGE（M6×20)
6. BOLT,FLANGE（M8×16)
7. CABLE,FRONT COVER
8. LOCKNUT，FLANGE (M10×1.25)
9. CABLE PULLEY
10. LOCKNUT，FLANGE(M8)
11. WINCH HOLDER
12. WINCH
13. BOLT,FLANGE（M10×1.25×70)

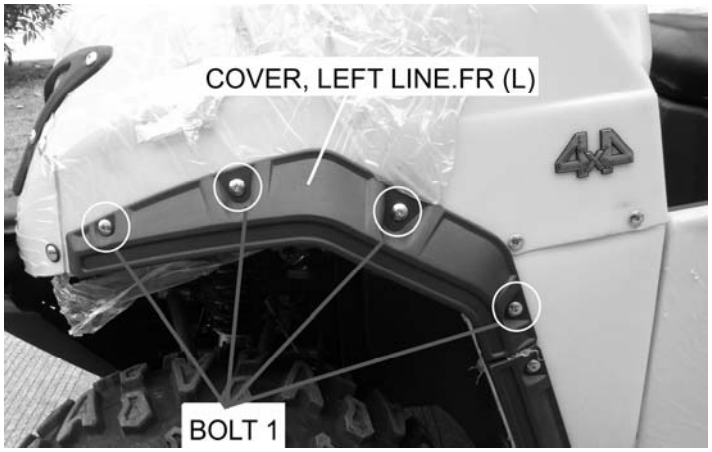
COVER, LEFT LINE.FR (L)

Remove

Remove bolt 1

Remove the front left line cover(L)

Remove the front right line cover(R) in same method.



Installation

Reverse the removal procedure for Installation.

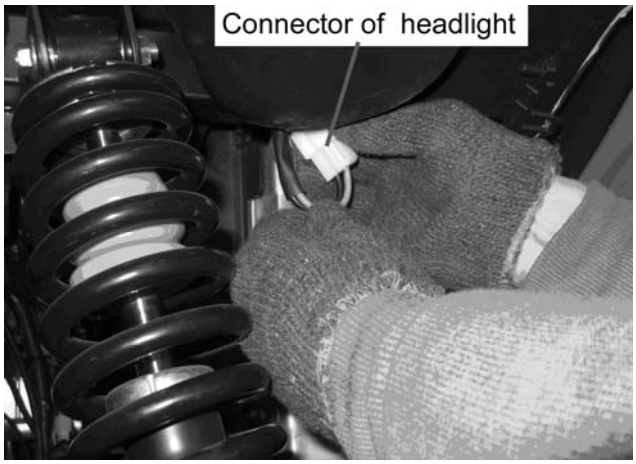
FRONT AIR GUIDE COVER ASSY

Remove

Separate the connector of headlight.

Remove the eight bolts 2.

Remove the front air guide cover assy.



Installation

Reverse the removal procedure for Installation.

FRONT COVER ASSY

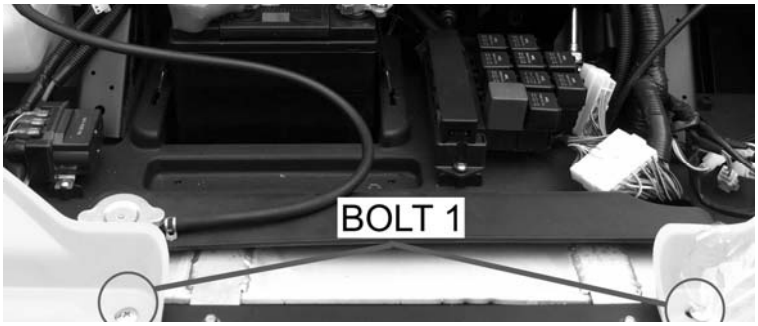
Remove

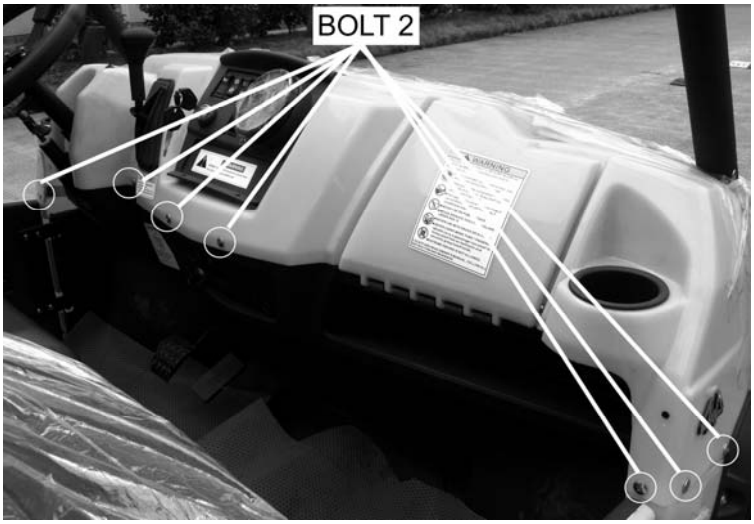
Remove the front air guide cover assy.(2-10)
Remove the steering wheel assy.(2-2)
Remove the gear change handle.

Remove the two bolts 1.

Remove the nine bolts 2.
Loosen all electronic component and plugs.

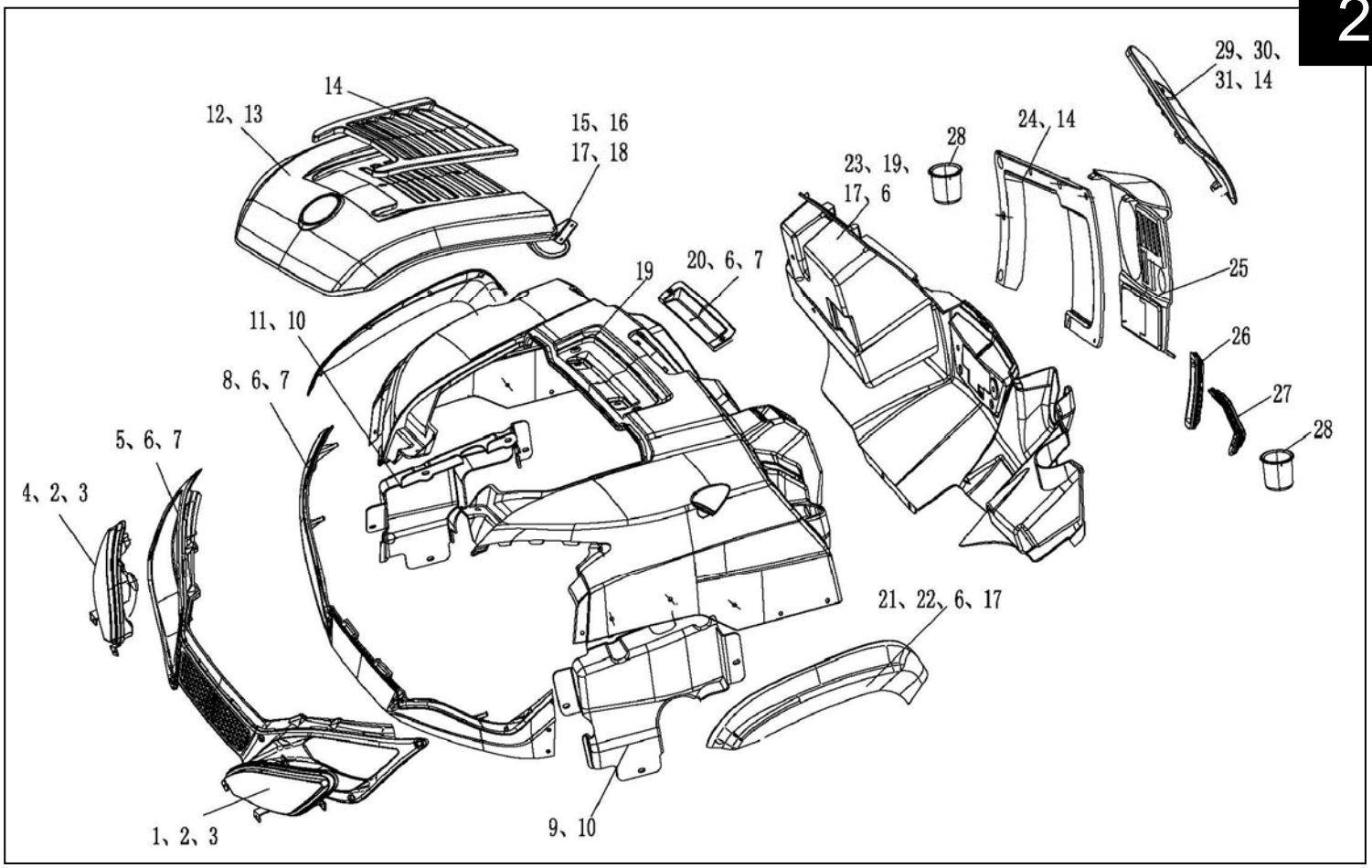
Remove the front cover assy.





Installation

Reverse the removal procedure
for Installation.

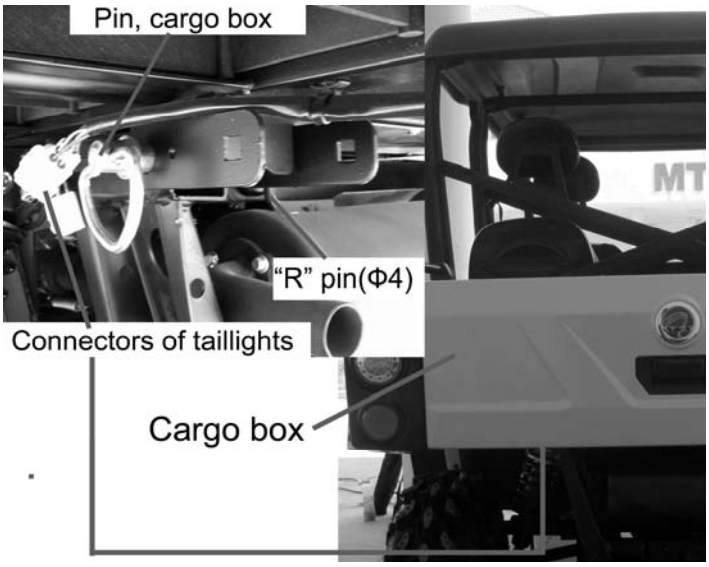


1. HEADLIGHT (L)
2. TAPPING SCREW(ST5.2×20)
3. WASHER (φ5×φ10×1)
4. HEADLIGHT(R)
5. FRONT AIR GUIDE COVER ASSY
6. SCREW(M6×20)
7. NUT(M6)
8. BOARDING，VENT GRILLE(FRONT)
9. FRONT MUDGUARDR(R)
10. EXPANSION SCREW (M8×20)
11. FRONT MUDGUARDR (L)
12. ENGINE COVER BOARD
13. TAPPING SCREW (ST4.2×20)
14. ENGINE COVER BOARD DECORATE COVER
15. SCREW (M6×20)
16. RUBBER WASHER(φ6)
17. GEMEL
18. NUT,CLIP（M6）
19. DECORATE COVER, FRONT COVER
20. FRONT COVER
21. COVER, LEFT LINE.FR (L)
22. COVER, RIGHT LINE.FR (R)
23. SCALEBOARD, METER PANEL
24. SEPTI-BOARD, STORE BOX
25. METER PANEL
26. AIRPROOF COVER, GEARSHIFT
27. AIRPROOF COVER, PARKING HANDLE
28. TEACUP COVER
29. COVER BOARD, STORE BOX
30. PIN
31. SUPPORT, PIN

Cargo box

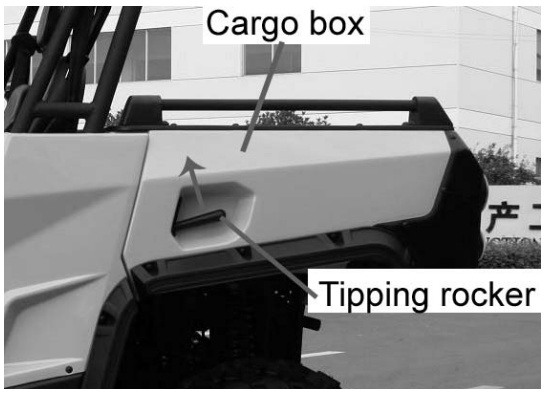
Remove

Remove the connectors of taillights
Remove the “R” pin (Φ4)
Remove the pin of cargo box.



Use the same method to remove the “R” pin and cargo box pin on the other side of the cargo box.

Figure direction pulling tipping rocker of cargo box.



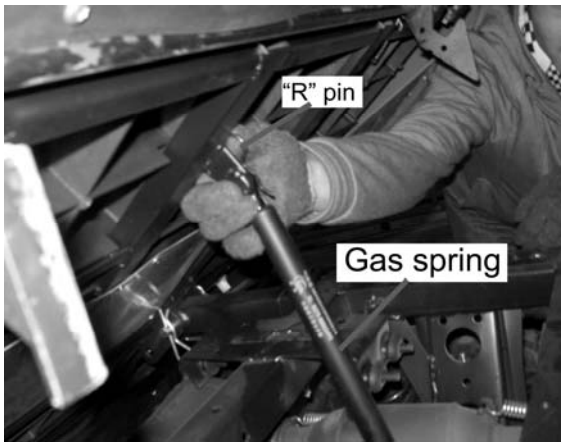
Remove “R” pin of gas spring.

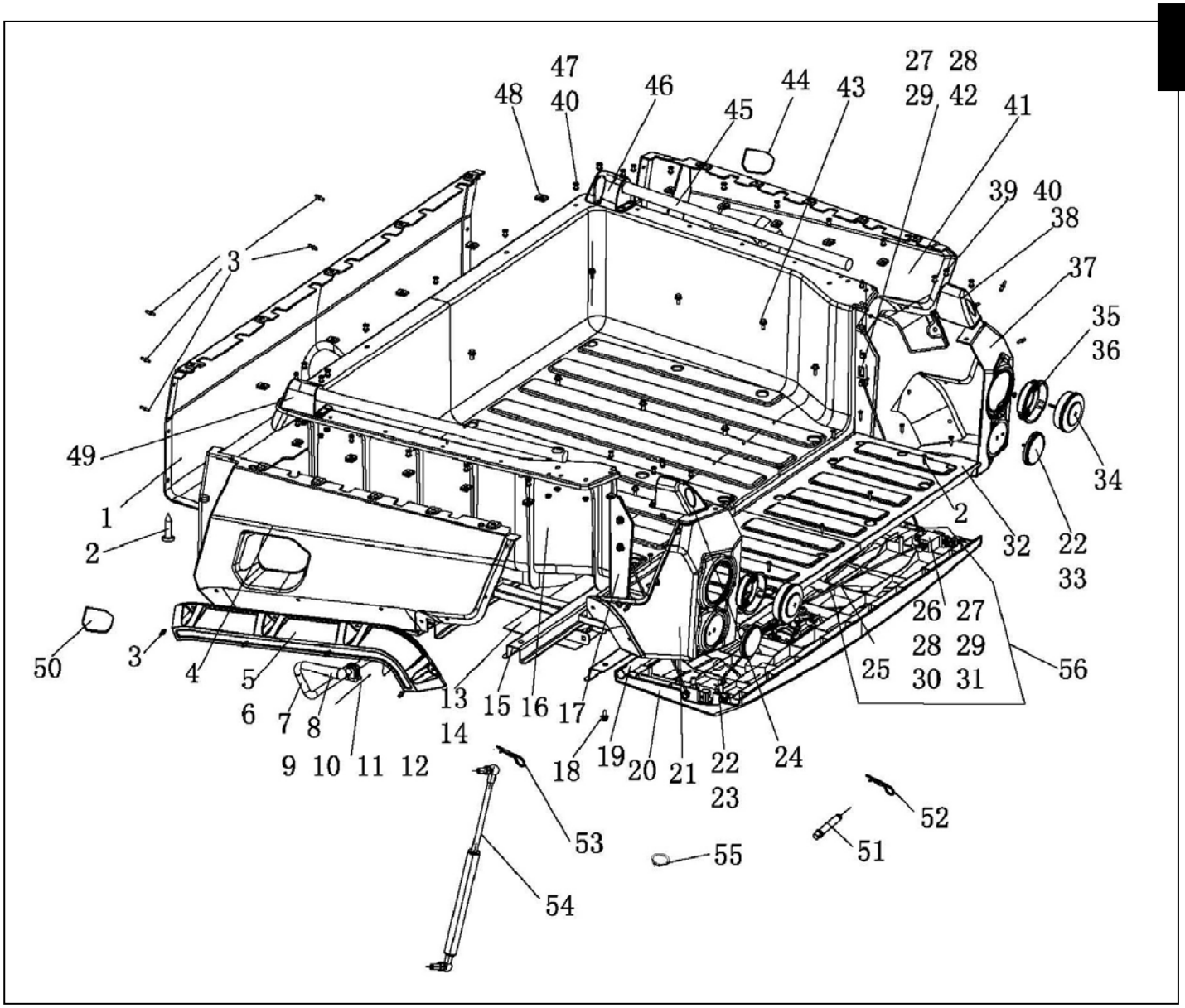
Remove connection of gas spring and cargo.

Remove cargo box.

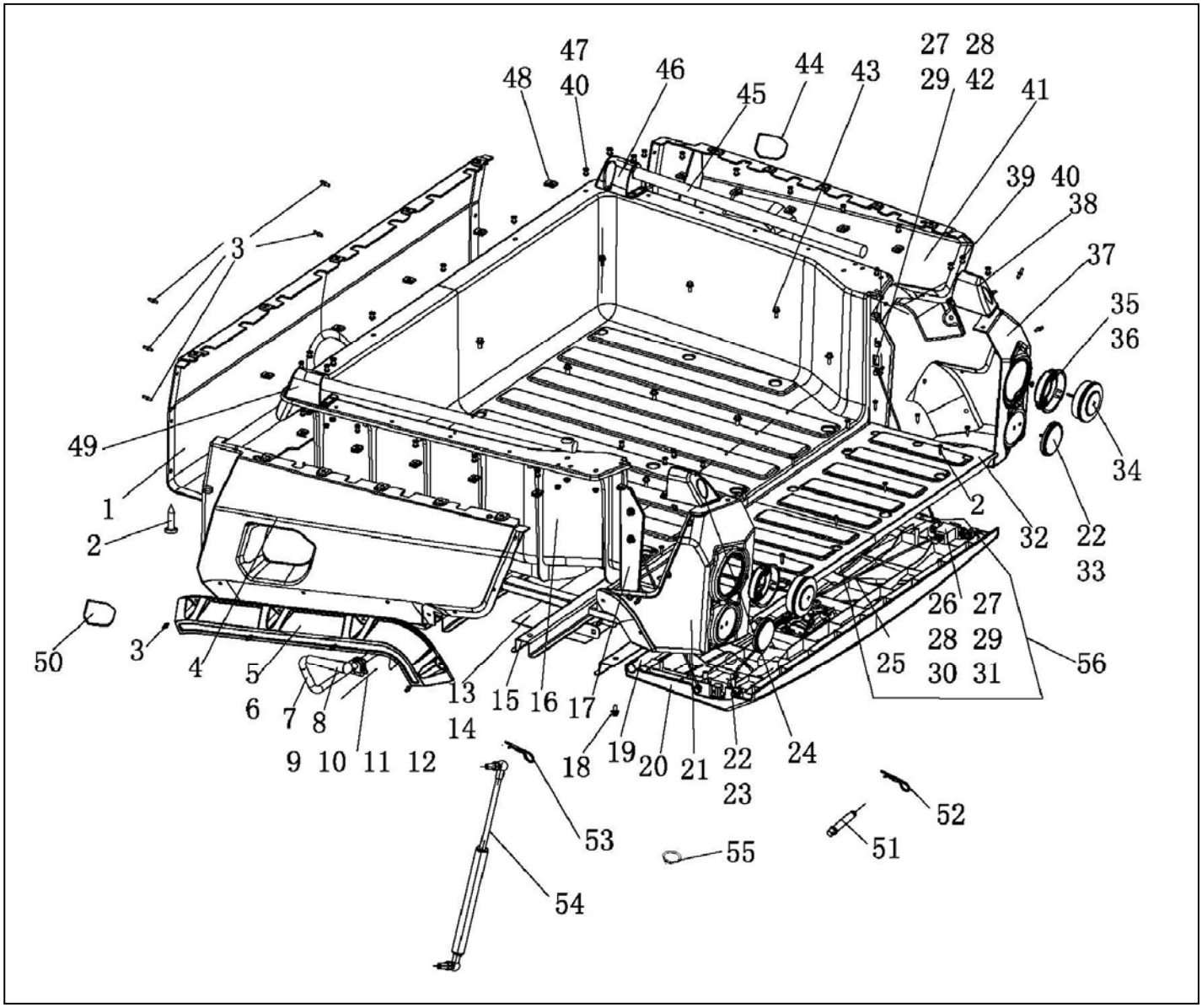
Installation

Reverse the removal procedure for Installation.





1. DECORATING COVER，CARGO BOX
2. TAPPING SCREW(ST5.2×20)
3. EXPANSION SCREW(M8×20)
4. LEFTWARD COVER，CARGO BOX
5. FENDER，CARGO BOX（L）
6. FENDER，CARGO BOX（R）
7. TIPPING ROCKER
8. ROCKER COVER, TIPPING
9. POTHOOK SEAT
10. TORSION SPRING (BIG)
11. BOLT,FLANGE（M8×45）
12. LOCKNUT，FLANGE(M8)
13. HEAT INSULATION BOARD
14. RIVET (5×20)
15. CARGO BOX FRAMRE
16. DECORATING COVER, CARGO BOX
17. HALF DOOR FRAMRE
18. BOLT,FLANGE（M8×12）
19. ROTATE PIN PIPE
20. BOARD，CARGO BOX DOOR
21. REAR CORNER COVER,CARGO BOX (R)
22. HANDLE，CARGO BOX DOOR
23. LOCKNUT，FLANGE(M6)
24. REAR HEIGHTEN WASHER(R)
25. TIE ROD, HALF DOOR
26. LOCK, GARGO BOX (L)
27. BOLT,FLANGE（M8×20）
28. PIN



29. NUT，FLANGE(M8)
30. CABLE,CARGO BOX
31. LOCK, GARGO BOX(R)
32. DOOR BOARD，CARGO BOX
33. REAR REFLECTOR
34. TAILLIGHT
35. TAILLIGHT SEAT
36. NUT，FLANGE(M5)
37. REAR CORNER COVER,CARGO BOX (L)
38. REAR HEIGHTEN WASHER (L)
39. SCREW（M6×30）
40. RUBBER WASHER(Φ6)
41. STARBOARD COVER，CARGO BOX
42. BUCKLE，PLATE
43. BOLT,FLANGE（M8×20）
44. CARGO BOX HANDLE RUBBER WASHER（R）
45. PROTECT COTE TUBE
46. FRONT HEIGHTEN WASHER (L)
47. SCREW（M6×20）
48. NUT,CLIP（M6）
49. FRONT HEIGHTEN WASHER(R)
50. CARGO BOX HANDLE RUBBER WASHER（L）
51. PIN, CARGO BOX
52. “R” PIN(Φ4)
53. “R” PIN(Φ3)
54. GAS SRPING, CARGO BOX
55. CIRCLIP(Φ8)
56. LOCK, GARGO BOX ASSY

Muffler

Caution: Perform disassembly only after the muffler is cooled down.

Remove

Remove two flange bolts (M10×30)

Remove tension spring of exhaust pipe.

Remove catalytic converter assy.

Remove exhaust pipe and muffler.

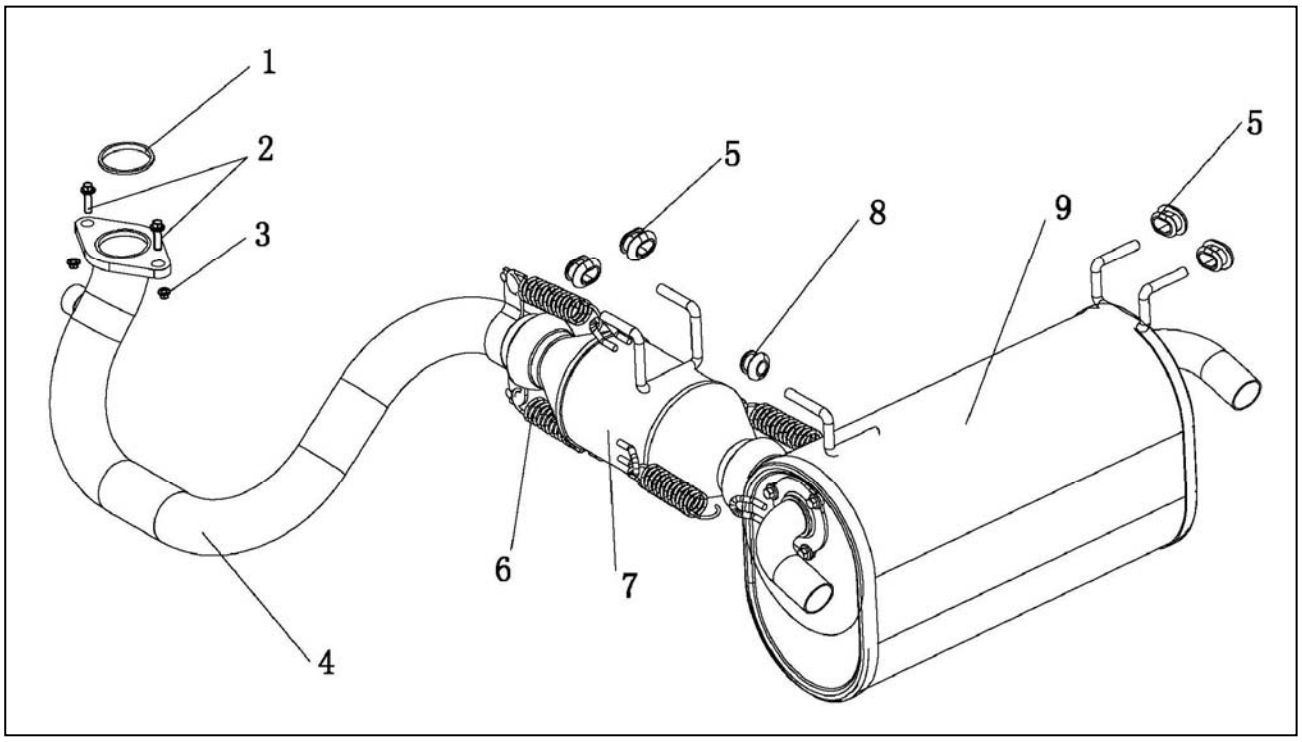
Note:

Replace seal ring when installing the muffler.

Installation

Reverse the removal procedure for installation

MUFFLER ASSY



1. SEAL RING
2. BOLT，FLANGE(M10×30）
3. LOCKNUT，FLANGE(M10)
4. EXHAUST PIPE
5. RUBBER WASHER A
6. TENSION SPRING, EXHAUST PIPE
7. CATALYTIC CONVERTER
8. RUBBER WASHER B
9. MUFFLER

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Overhaul Info

Operation Cautions

Note

- DO NOT keep the engine running for long time in a poorly ventilated or enclosed place because of the harmful components like CO, etc, in the exhaust gas.
- The muffler and engine are still very hot when the engine is just stopped. Careless contact may cause serious burn. Be sure to wear fatigue dress with long sleeves and gloves if the work has to be done after the engine is just stopped
- Gasoline is highly flammable, smoking is strictly forbidden in the work place. Keep alert on the electrical sparks. Besides, vaporized gasoline is highly explosive, so work should be done in a well-ventilated place.
- Be careful that your hands or clothes not get nipped by the turning or movable parts of the driving system.

Note

The vehicle should be parked on hard and level ground.

Replace parts regularly

Parts replacement time is subject to time or kilometers, whichever occurs first.

Regular Maintenance Table

The table below lists the recommended intervals for all the required periodic maintenance work necessary to keep the vehicle at its best performance and economy. Maintenance intervals are expressed in terms of kilometer, miles and hours, whichever occurs first.

Note: More frequent maintenance may be required on vehicles that are used in severe conditions.

Interval / Item					
	Km	Initial 250km	Every 500 km	Every 1000 km	Remarks
	Hours	Initial 20 hours	Every 50 hours	Every 100 hours	
Valve clearance		I	—	I	IN： 0.18±0.05 EX： 0.25±0.05
Idle Speed		I	I	—	850 r/min±50r/min
Spark plug		I	—	I	No carbon deposit, Gap：0.9~1.1mm
		R(Every :6000km)			
Air Filter		—	I	C	R(every :20000km)
Fuel Hose, carburetor		—	—	I	
Clutch		—	—	I	R(every: 4-year)
Drive Belt		—	I	—	
Oil Filter		R	—	R	
Oil change		R	—	R	
Coolant Level		I	I	—	
Water Hose & Pipes		I	—	I	
Coolant		R(every: 2-year)			

I－Check and adjust, or replace if necessary

R－Replace

C－Clean

Inspection & Maintenance ○: Interval

Check Item			Interval			Standard
Part		Item	Daily	1/2 Year	Annual	
Steering System	Steering wheel	Operation agility	○		○	
	Steering System	Damage	○		○	
		Installation condition of steering system	○		○	
		Sway of ball stud	○		○	
Brake System	Brake pedal	Free play	○	○	○	Pedal: rear end 0mm
		Brake Efficiency	○	○	○	
	Connecting rod, oil pipe & Hose	Looseness, Slack and damage	○		○	
	Hydraulic brake and brake disc	Front and rear brake fluid level	○	○	○	Brake fluid should be above LOWER limit
		Brake disc damage and wear	○	○	○	Replace when the thickness of front brake disc is less than 3mm, rear brake less than 3mm
Driving System	wheel	Tire pressure	○	○	○	Front tire ： 83kPa (12±1PSI) Rear tire ： 83kPa (12±1PSI)
		Chap and damage	○		○	No wear indication on the surface of tire (the remained depth of groove should not be less than 3mm)
		Groove depth and abnormal wear	○		○	
		Loosened wheel nut and axle	○	○	○	
		Sway of front wheel bearing	○		○	
		Sway of rear wheel bearing	○		○	
Buffer System	Suspension arm	Sway of joint parts, rocker arm damage	○		○	
	Shock absorber	Oil leakage and damage	○		○	
		Function			○	
Drive-Train system	Front axle	Transmission, lubrication`	○		○	
	Rear axle	Transmission, lubrication	○		○	
	Gear box	Transmission, lubrication	○		○	

Check Item			Intervals			Standard
Part		Item	Daily	1/2 year	Annual	
Drive Train	Final shaft (Drive shaft)	Looseness of joint parts	○	○	○	
		Sway of Spline			○	
Electrical System	Ignition Device	Spark plug		○	○	
		Ignition timing		○	○	
	Battery	Terminal Joint			○	
	Wiring	Looseness and damage of joints			○	
Engine	Fuel device	Fuel leakage		○	○	
		Throttle			○	
	Cooling system	Coolant level	○	○	○	
		Coolant leakage			○	

Check Item		Intervals			Standard
Part	Item	Daily	1/2 year	Annual	
Lighting device and turning indicators	Function	○	○	○	
Alarm and lock device	Function			○	
Instruments	Function			○	
Exhaust pipe and muffler	Looseness or damage caused by improper installation			○	
	Function of muffler			○	
Frame	Looseness and/or damage			○	
Others	Lubrication & grease of frame parts			○	
Abnormal parts which can be determined when driving	Make sure if there is any abnormal with relative parts.	○			

Shift Linkage Inspection / Adjustment

Linkage rod adjustment is necessary when symptoms include:
• No All Wheel Drive light
• Noise on deceleration
• Inability to engage a gear
• Excessive gear clash (noise)
• Shift selectors moving out of desired range

NOTE: Remove necessary components to gain access to shift linkage cable ends.

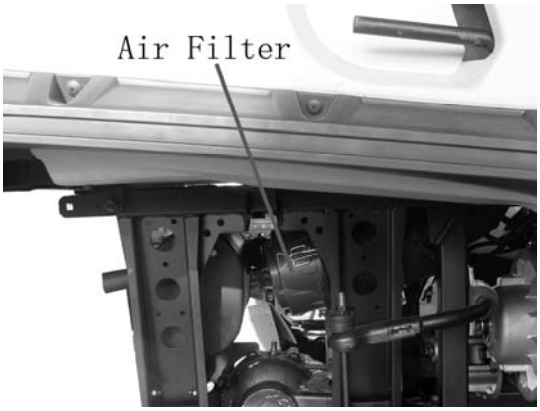
1. Inspect shift linkage cable, clevis pins, and pivot bushings and replace if worn or damaged.
2. Be sure idle speed is adjusted properly.
3. Place gear selector in neutral. Make sure the transmission bell crank is engaged in the neutral position detents.
4. With two wrenches loosen the outside jam nut counterclockwise. Turn the outside jam nut 1 1/2 turns. Perform this procedure on the shift lever end, also.
5. After turning the outside jam nut 1 1/2 turns. Hold the outside jam nut with a wrench and tighten the inside jam nut clockwise, until it is tight against the bracket.
6. Repeat Step 4 and Step 5 until the proper adjustment is made for the transmission cable.
7. Use this procedure to loosen or tighten the shift linkage cable as needed.

Fuel system and air intake

Fuel Lines

1. Check fuel lines for signs of wear, deterioration, damage or leakage. Replace if necessary.
2. Be sure fuel lines are routed properly and secured with cable ties. **CAUTION:** Make sure lines are not kinked or pinched.
3. Replace all fuel lines every two years.

Air Filter Service



It is recommended that the air filter be replaced annually. When riding in extremely dusty conditions replacement will be required more often.
The filter should be inspected periodically before each ride, using the following procedure.
The air box is located rearward of the engine.
1. Remove clips from air box cover and remove cover. Inspect the gasket. It should adhere tightly to the cover and seal all the way around.
2. Remove air pre-filter assembly. Do not clean the main filter, the filter should be replaced.
3. Inspect main element and replace if necessary. If the filter has been soaked with fuel or oil it must be replaced.

Installation

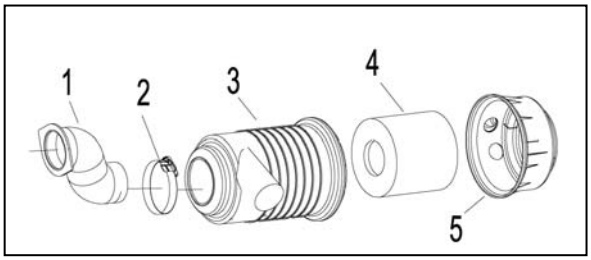
1. Reinstall the filter into the air box container. Be sure the filter fits tightly in the air box.

NOTE: Apply a small amount of general purpose grease to the sealing edges of the filter before installing.

2. Check air box. If oil or water deposits are found, drain them into a suitable container.

NOTE: Service more frequently if vehicle is operated in wet conditions or at high throttle openings for extended periods.

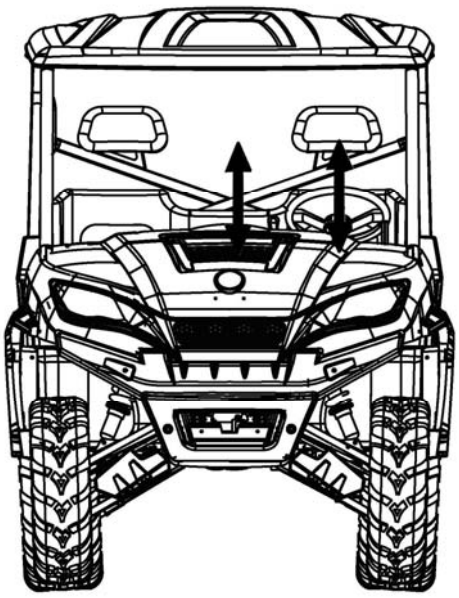
3. Install air box cover and secure with clips.



1.JOINT,AIR CLEANER 2. CIRCLIP
3. PRIMARY COVER 4. FILTER ELEMENT
5. TAIL COVER

Steering Stem

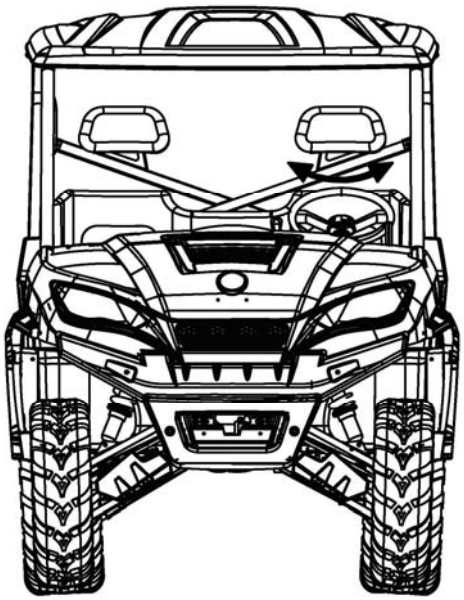
Park the vehicle on level place, hold steering wheel, and shake in the direction as illustrated on the right and see if there is any sway



In case of any sway, check if it is the problem of the steering stem or other parts and then do the maintenance accordingly.

In case of sway of the steering stem, tighten the locknut or disassemble the steering stem for further check.

Park the vehicle on level place, slowly turn the steering wheel left and right to see if it can turn freely.



In case there is any hindrance, check if there is any interference. If no, check the steering tie-rod end, and check if the steering stem bearing is damaged

Note:
Make sure the steering can be operated freely.
An accident may occur if the steering wheel is out of control.

BRAKE SYSTEM

Master Cylinder

Fluid level Check the brake fluid level When the brake fluid level is near to the minimum(Minimum=1/4H) limit line, check master cylinder, brake hoses and joints for leakage.

Remove fluid reservoir cap.

add DOT3 or DOT4 brake liquid till the maximum (Maximum=H) limit line.

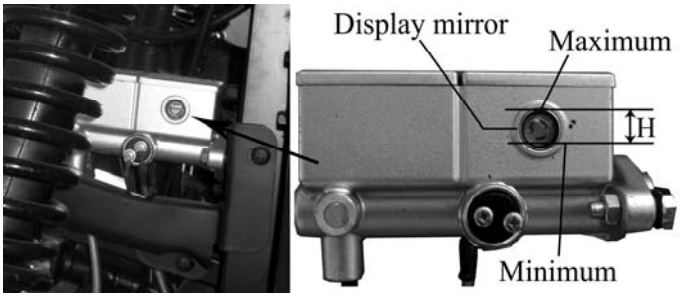
Do not mix with dust or water when adding brake fluid.

Use only the recommended of brake fluid to avoid chemical reaction.

Brake fluid may cause damages to the surface of the plastic and rubber parts.

Keep the fluid away from these parts.

Slightly turn the steering wheel left and right till the master cylinder is in horizontal, then remove the fluid reservoir cap.

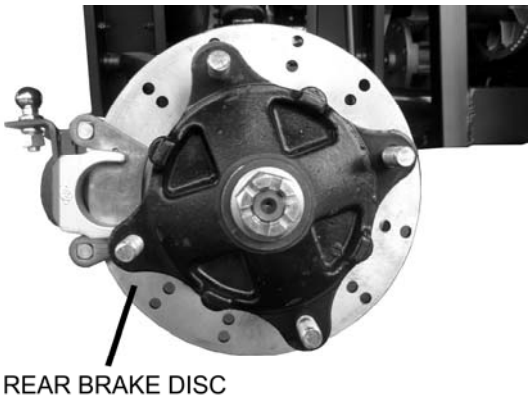


Brake Disc, Brake Pad

< Wear of brake pad>

Check the brake pad wears from the mark as indicated.

Replace the brake pad if the wear has reached position of wear limit trough.



Note

The brake pad must be replaced with a whole set.

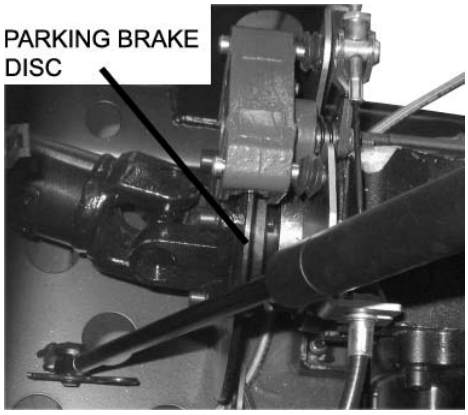
Checking and replacing the brake disc

Front brake disc thickness: ≤3 mm →Replace

Rear brake disc: ≤3mm →Replace

Min. limited thickness of the front brake disc:3mm

Min. limited thickness of the rear brake disc:3mm



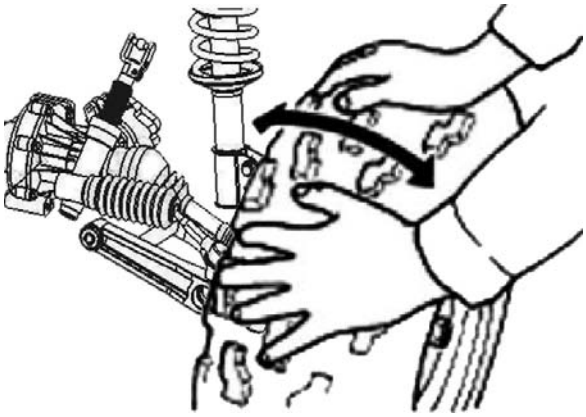
Change The Brake Fluid

< Changing Brake Fluid>

Change the brake fluid once every year.

Wheels

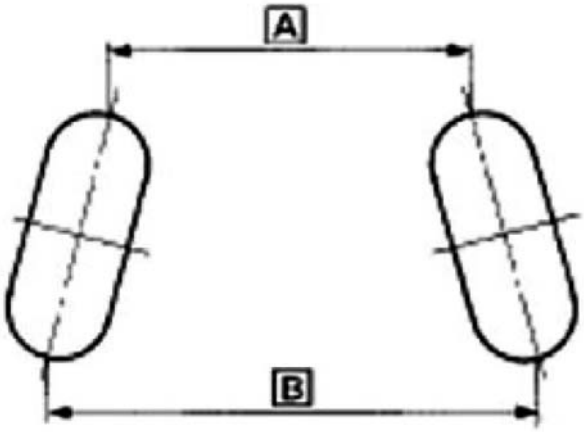
Lift front wheel on level place, and make sure there is no loading on the wheels.
Shake the front wheel left and right to check whether the joint of front wheel is tightened and check whether it sways.



Not tighten enough ? Tighten it sway: Replace the rocker arm

Front Toe-in size

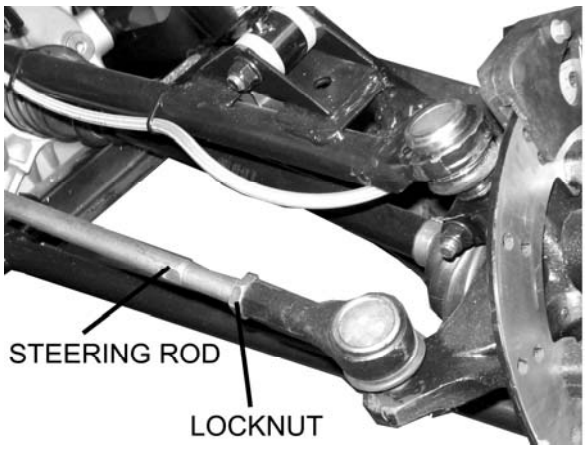
Park the vehicle on level place, measure the front toe-in
Toe-in: B-A=0 ~ 10mm



Toe-in out of the range , Adjust the locknut of tie-rod

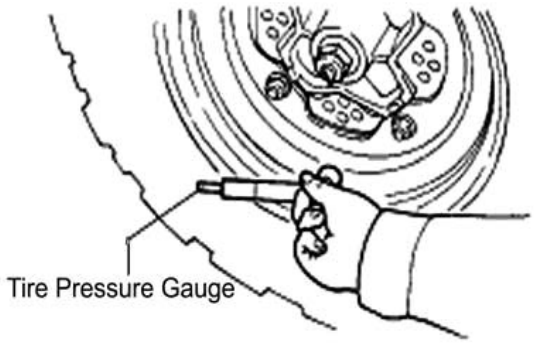
Note:

After the toe-in has been adjusted, slowly run the vehicle to check whether the direction of vehicle can be controlled by steering wheel.



Tire pressure

Check the pressure of the tires with a pressure gauge.



Note

Check the tire pressure after tires are cooled.
Driving under improper tire pressure will reduce the comfort of operation and riding, and may cause deflected wear of the tires.

Specified pressure /tire

	Front wheel	Rear wheel
Pressure	96.5±3. 5kPa (14±0.5PSI)	96.5±3. 5kPa (14±0.5PSI)
Tires sizes	27×9-14	27×11-14

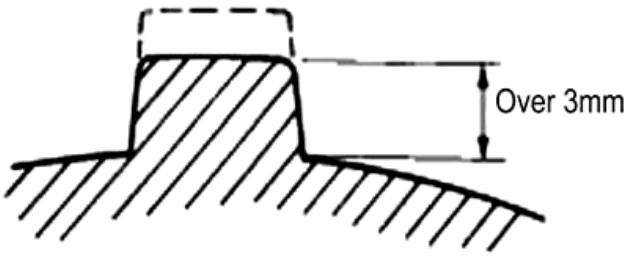
OPTIONAL：

	Front wheel	Rear wheel
Pressure	82.5±3. 5kPa (12±0.5PSI)	82.5±3. 5kPa (12±0.5PSI)
Tires sizes	26×9-14	26×11-14

Tire Tread

Check the tire tread.

Tread Height: if < 3mm, then Replace with new tires



Note:

When the tread height is less than 3mm,
the tire should be replaced immediately.

Wheel Nut and Wheel Axle

Check front and rear wheel axle nuts for looseness

Loosened axle nuts

Tighten

Tightening Torque:

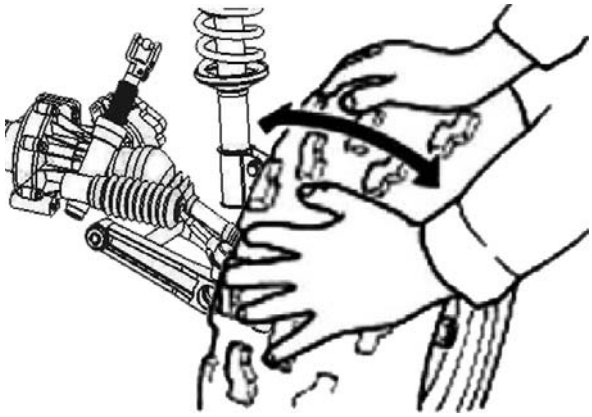
Front wheel axle nut:

180-200N.m (18.3kgf.m-20.3kgf.m)

Rear wheel axle nut:

180-200N.m (18.3kgf.m-20.3kgf.m)

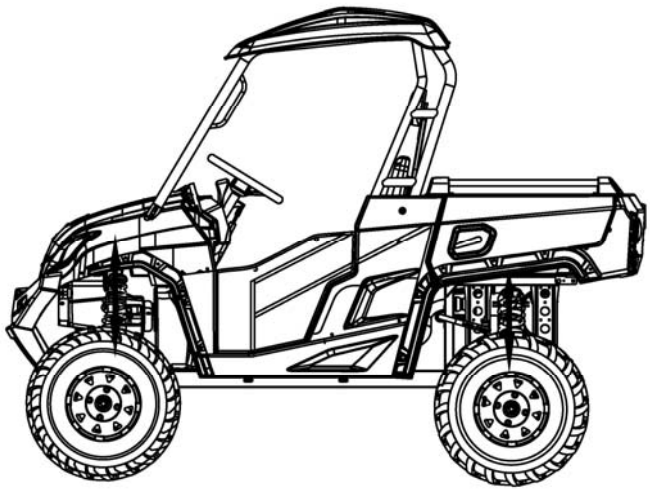
Sway of Wheel Bearing



Lift the front wheel

Make sure there is loading on the vehicle shake the wheel in axial direction for any sway In case of any sway, disassemble the front wheel and check the bearing

Suspension System

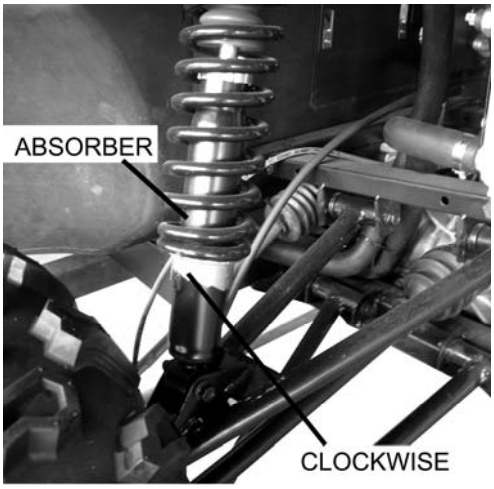


Park the vehicle on lever place, press the vehicle Several times up and down as illustrated on the right

In case of any rocking or abnormal noise, check whether there is any oil leakage from absorbers, or any damage or looseness of tightening parts.

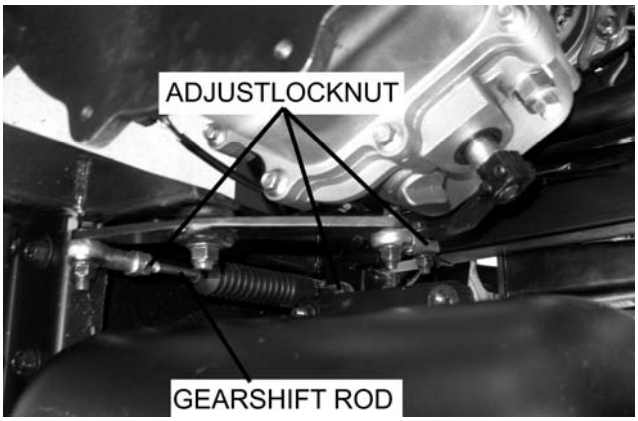
Adjusting the Absorber

Use special tools to adjust the length of absorber according to loading requirement Turn clockwise to adjust from high to low.



Gear Shifting

Shift the gear to check for flexibility and gear engagement Adjust the gearshift rod if necessary Release the lock nut to adjust the length of gearshift rod

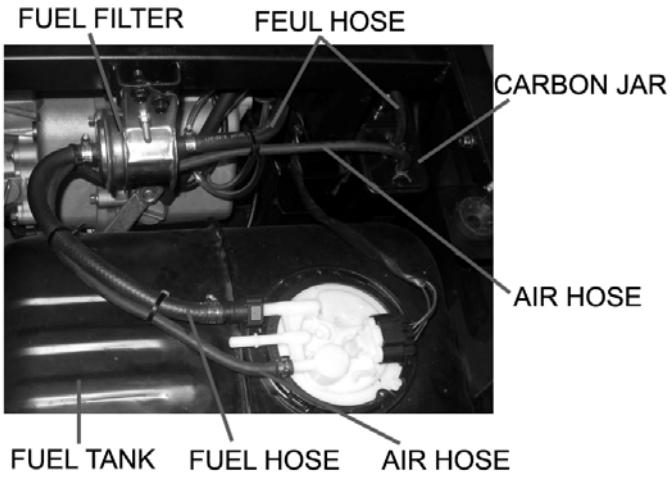


Fuel Device

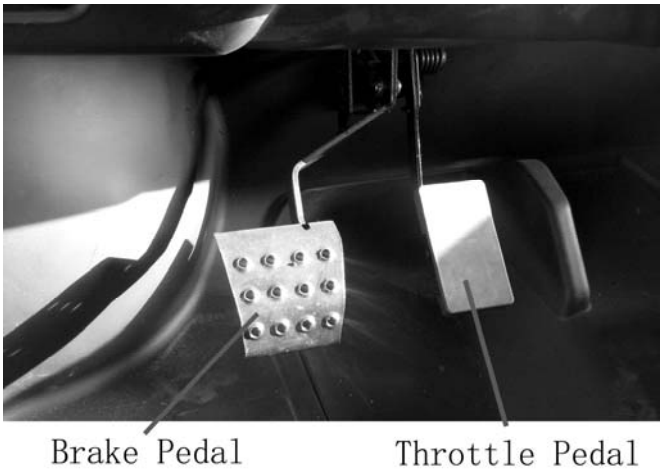
Status of the fuel system

Remove the seat

Check the fuel hose for any aging or damage. Aged or damaged fuel hose: Replace Check if there is cracks or bending with the fuel hose. Cracked or bended fuel hose: Replace



Throttle Pedal Check



Check the free play of throttle pedal
Free play: 1.5-3mm

If out of range, then adjust
Loosen locknut of throttle cable turn the regulator and adjust free play of throttle pedal

After adjusting, tighten locknuts and install throttle cable sleeve.

Replace with a new throttle cable if the specified free play could not be acquired by adjusting the regulator or if there is still stickiness with the throttle.

Cooling System

Note

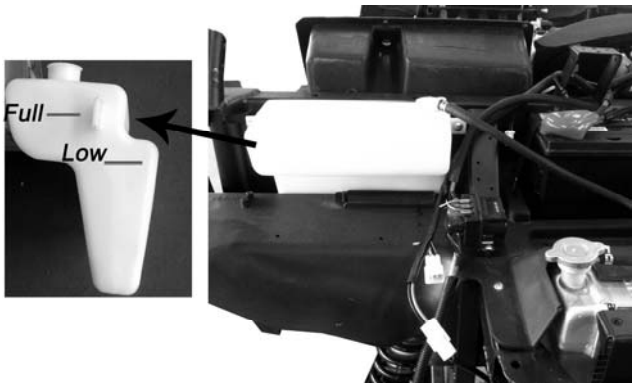
- Check coolant level from reservoir tank.
  Do not check from radiator.

  If the radiator cap is opened while the engine is hot (over 100 ℃), the pressure of the cooling system will drop down and the coolant will get boiled rapidly.

  DO NOT open the radiator cap until the coolant temperature drops down.
- Coolant is poisonous, DO NOT drink or splash it to skin, eyes, and clothes.
  —In case the coolant gets to the skin and clothes, wash with soap immediately.
  —In case the coolant gets into eyes, rinse with plenty of water and go to consult the doctor
  —In case of swallowing the coolant, induce vomit and consult the doctor.
- Keep the coolant in a safe place and away from reach of children.

Coolant level

Coolant might reduce due to natural evaporation.
Check the coolant level regularly.



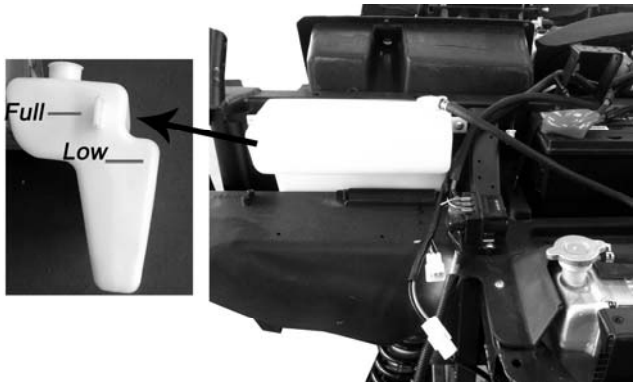
Note

- Coolant can prevent rust and resist freeze.
  Ordinary water may cause engine rust or cracks in winter due to freezing.
- Park the vehicle on level ground for checking of the coolant. Inclined vehicle body will cause incorrect judging of the coolant level.
- Check the coolant after the engine is warmed up.
  Start and warm up engine.

  Stop the engine.
  Check if the coolant level is between the upper and lower limit.

When the coolant level is below the LOWER limit, remove reservoir tank cap and add coolant till upper limit. (Add coolant or diluted original liquid).

Recommended coolant: XYPOWER coolant
Standard density: 50%
(Freezing temperature of coolant varies according to the different mixture ratio. Adjust the mixture ratio according to the lowest temperature in the place where the vehicle is used.)



If the coolant reduces very fast, check if there is any leakage. The cooling system may be mixed with air when there is no coolant in the reservoir tank and the air should be discharged before adding coolant.

	The coolant concentration	
	coolant	water
General area	50%	50%
Extreme cold	60%	40%

Coolant Leakage

Check radiator hose, water pump, water pipes and joints for leakage.
In case of any leakage, disassemble and do further check. (Refer to Chapter 4)

Check the radiator hose for aging, damages or cracks.

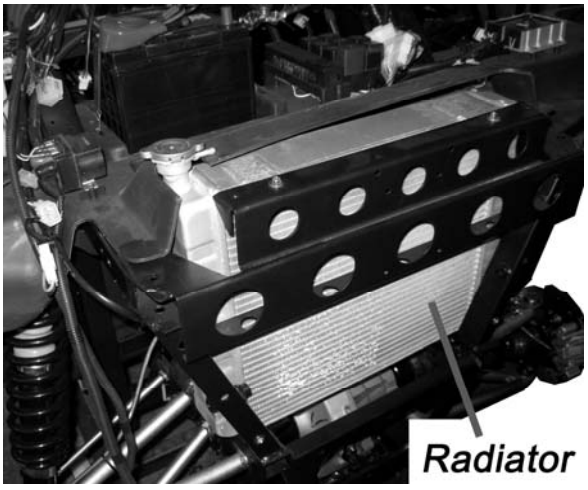
The rubber hose will naturally get aged after a period of service time. The aged hose may get cracked when the cooling system is heated. Nip the hose with fingers and check if there are any tiny cracks.

In case of any abnormal, replace with a new hose.

Check the clamps of the coolant pipes and hose. Tighten properly in case of any looseness.

Check radiator fins for mud and dust clog or damage.

Correct the bent fins; clean the mud with water and Compressed air. When the damaged area of the radiator fin is over 20%, replace with a new radiator.



Check Water Temperature Gauge

When engine is not working, the water temperature should be in the “0” position. Start the engine to check if the indicator works. If the indicator is not working, do the maintenance in time.

Overhauling Info……4-1
Trouble Shooting……4-2
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Overhaul Information

Note

- **If the radiator cap is opened when the coolant temperature is above 100℃, the pressure of coolant will drop and get boiled rapidly. The steam jet may cause danger and injury. Cover the cap with a piece of rag after the coolant temperature goes down and open the cap slowly.**

- **Inspection of coolant should be done after the coolant is fully cooled.**

- **Coolant is toxic. Do not drink or splash it to skin, eyes or cloth.**

—If coolant splashes in your eyes, thoroughly wash your eyes with water and consult a doctor.
—If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.
—If coolant is swallowed, induce vomit immediately and see a physician.
—Store the coolant properly and keep it away from reach of children.

- **Check radiator fins for mud block and/or damage. Correct the bent fins. Clean off the mud With water and compressed air. Replace with a new one if the damaged fin area reached 20%.**

- The overhauling of the water pump can be done without removing the engine.
- Add coolant through reservoir tank. Do not open the radiator cap except when disassembling the cooling system for adding or drainage of coolant.
- Do not stain the plastic parts with coolant. In case of any coolant stains, flush with water immediately After disassembly of the cooling system, check the joints for leakage with a radiator cap tester (available in the market)
- Refer to Chapter 10 for overhauling of temperature transducer.

Inspection standard

Item		Standard
Coolant Capacity	Full capacity	4500ml
	Reservoir tank capacity	3300ml
	Standard density	50%
Opening pressure of radiator cap		108kpa(1.1kgf/cm^2)
Thermostat	Valve open temperature	72±2℃
	Full open Temperature	88℃
	Full open lift	3.5-4.5mm

Trouble Shooting

Sharp rise of water temperature

- Faulty radiator cap
- Air in cooling system
- Faulty water pump
- Faulty thermostat (thermostat is not open)
- Clogged radiator pipe or cooling pipes
- Damage or clogged radiator fin
- Coolant is not enough
- Faulty or malfunction of fan motor

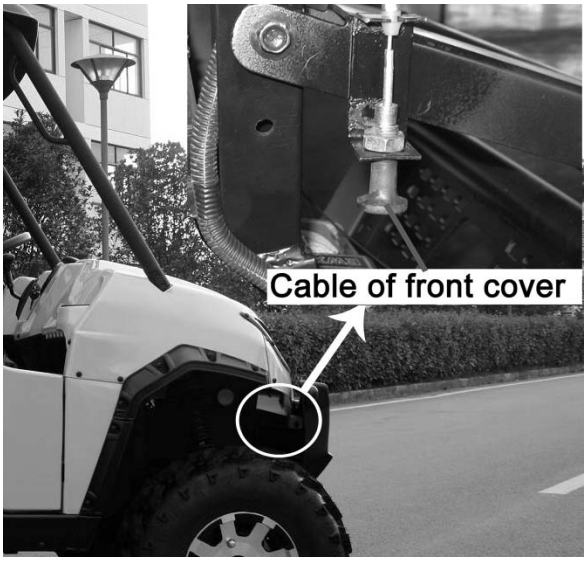
No rise or slow rise of water temperature.

Faulty thermostat (thermostat is not closed)
Faulty circuit of water temperature display

Coolant leakage

- Faulty water seal
- O-rings are aged, damaged or improperly sealed.
- Washers are aged, damaged or improperly sealed.
- Improper installation of pipes or hoses
- Pipes and/or hoses are aged, damaged or improperly sealed

Check and Maintenance



Checking coolant density

Note:
Open the radiator cap after coolant is fully cooled.

Open the front cover.
The diagram in the direction of the arrow pulling cable.
Open the front cover.
Remove radiator cap (counter clockwise).

Check with a densimeter if the coolant density adapts to the local temperature.

Check coolant for stains or impurities.

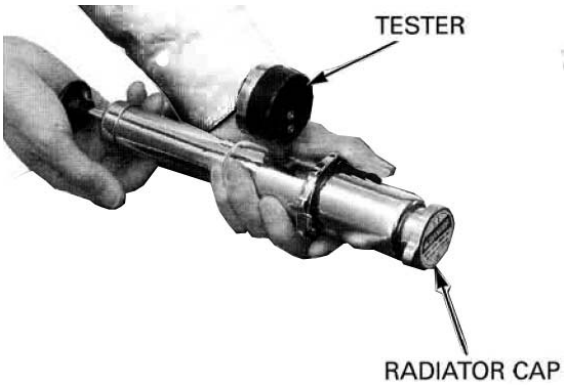
Inspection of radiator cap
Note
Open the radiator cap after the coolant is fully cooled.

Remove:
Remove bolt 1 and battery panel
Remove radiator cap (counter clockwise)..

Note
Apply coolant on the sealing surface of radiator cap before attaching the tester to the radiator cap.

Install the radiator cap tester to the radiator cap;

Apply the specified pressure (radiator cap opening pressure) for 6 seconds and make sure that there is drop in pressure.



Opening pressure of radiator cap:

108~137kpa(1.1~1.4kgf/cm^2)

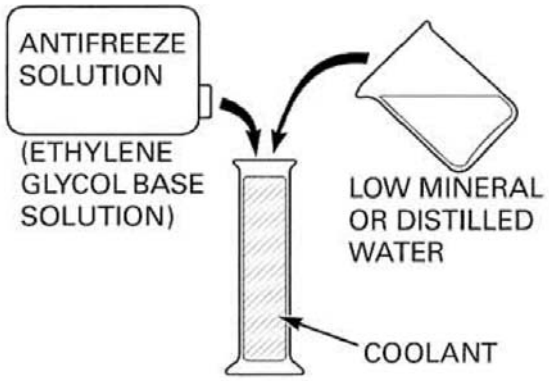
Pressure testing of cooling system

Install the radiator cap tester to the radiator cap;

Apply the specified pressure (radiator cap opening pressure) for 6 seconds and make sure that there is drop in pressure.

Note
Do not apply pressure over the specified pressure [108~137kpa(1.1~1.4kgf/cm^2)], or the cooling system may be damaged.

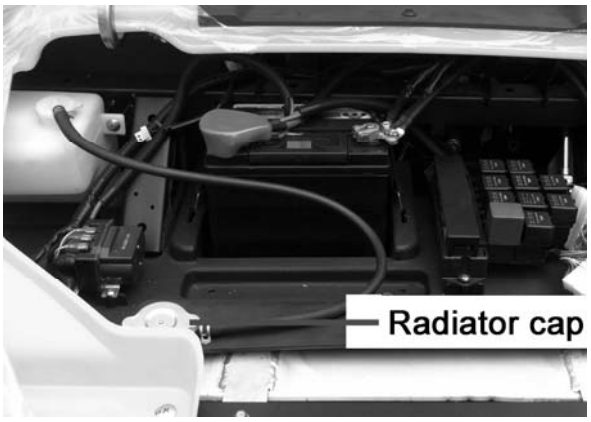
In case there is any pressure leakage, check the pipe, joint parts, joints of water pump and drainage (→4-5).



Replacing Coolant, Air Discharge

Preparation of coolant
Coolant is toxic, DO NOT drink or splash it to skin, eyes, and clothes.
—If coolant splashes in your eyes, thoroughly wash your eyes with water and consult a doctor.
—If coolant splashes on your clothes, quickly wash it away with water and then with soap and water.
—If coolant is swallowed, induce vomit immediately and see a physician.
—Store the coolant properly and keep it away from reach of children.

Note
Mix the coolant (undiluted) with soft water according to the temperature 5℃ lower than the actual lowest local temperature.



Coolant should be made from undiluted coolant with soft water.

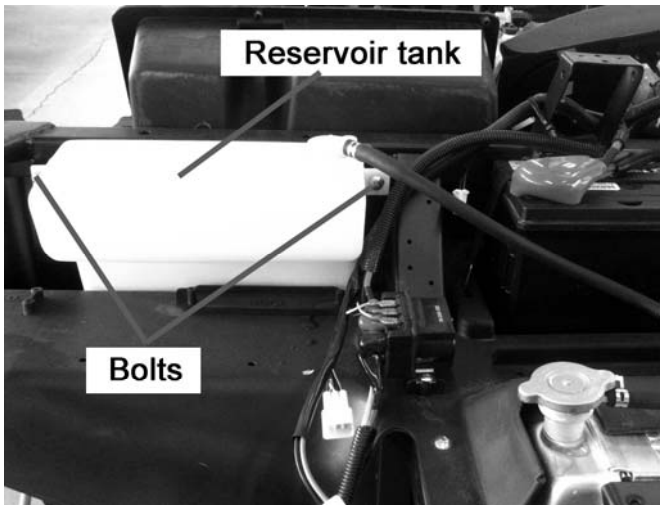
Standard density of coolant: 30%

Recommended coolant: XYPOWER coolant
(Direct application without having to be diluted)

Drainage of coolant
Remove radiator cap cover
Note
Open the radiator cap after the coolant is fully cooled.
Remove:
Open the front cover (→4-3)
Remove Radiator cap. (→4-3)

Reservoir Tank

Remove:



Remove front cover assembly (→2-11)
Remove 2 bolts
Remove water hose of reservoir tank

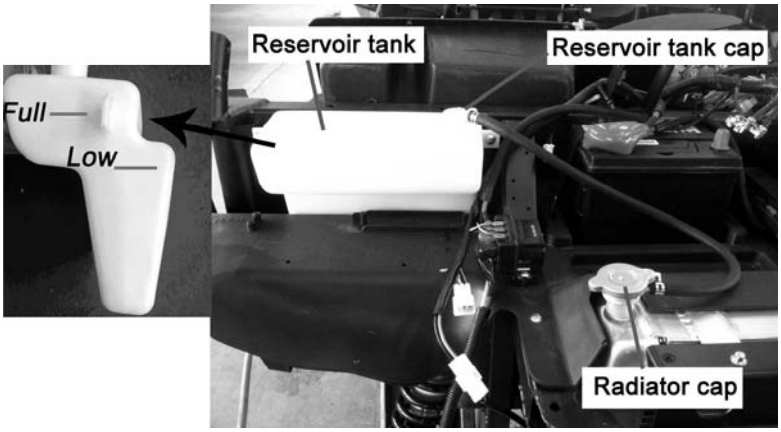
Remove reservoir tank; discharge coolant;
Flush reservoir tank
Install reservoir tank;

Adding Coolant

Add coolant through filling port.

Start the engine and discharge air from cooling system
Check from filling port that air is fully discharged from cooling system and install the radiator cap

Remove reservoir tank cap and add coolant till the full limit.



Note:
Check coolant level when the vehicle is on an even ground.

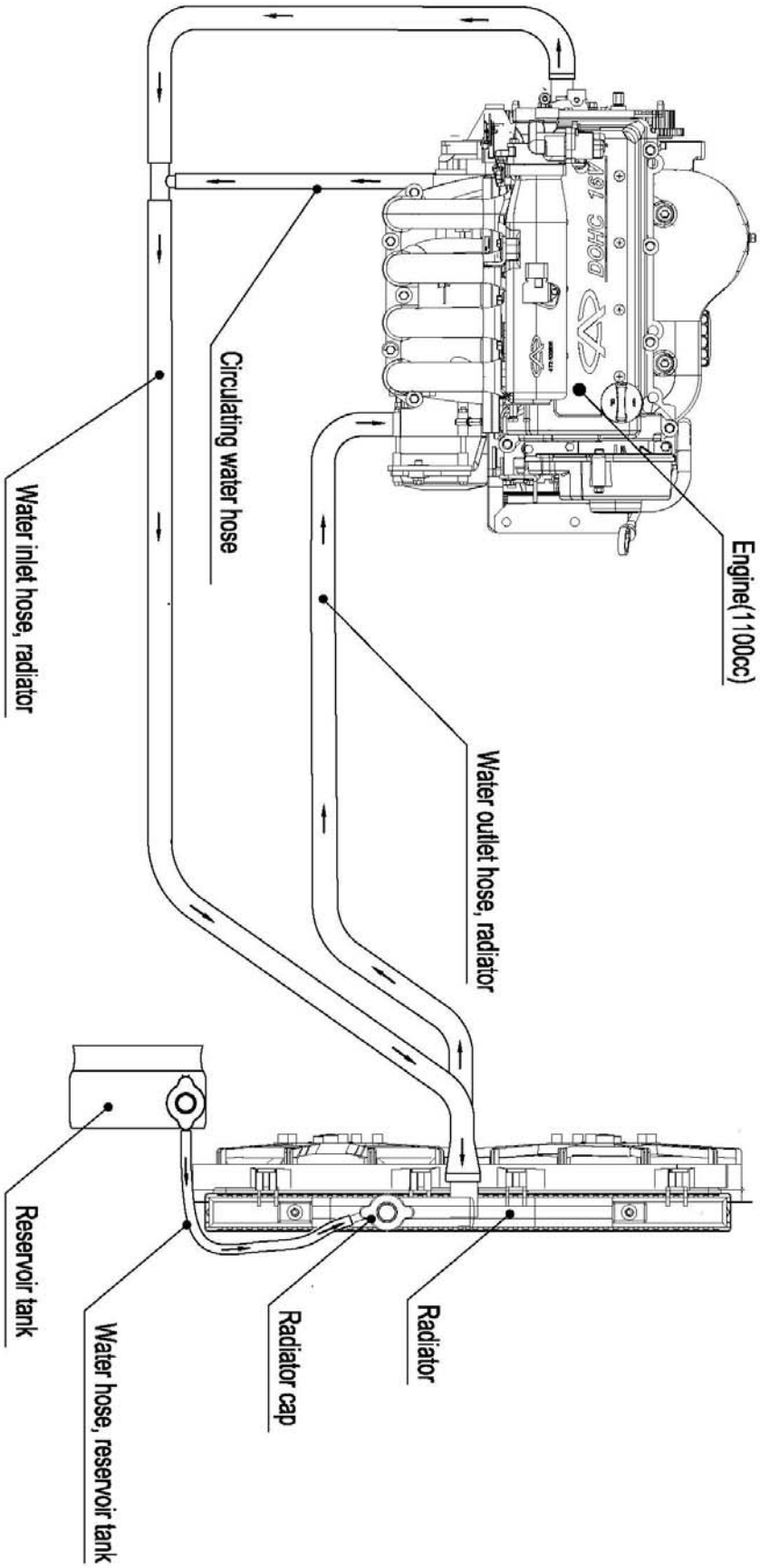
Air Discharge

Discharge the air from cooling system according to the following steps:

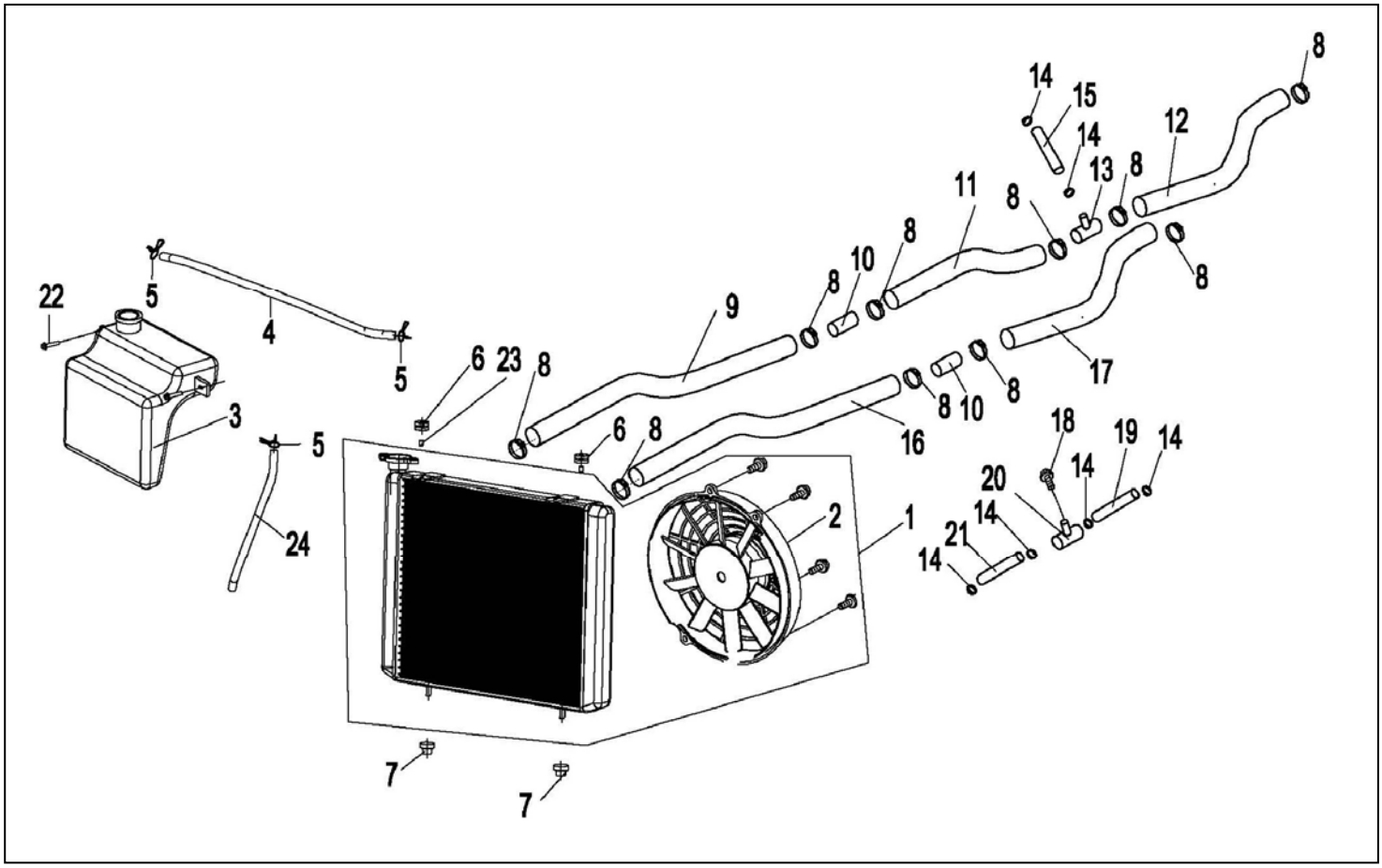
1. Start the engine and run it several minutes at idle speed
2. Quickly increase throttle 3~4 times to discharge air from cooling system;
3. Add coolant till filling port;
4. Repeat step 2 & 3 till no more coolant can be refilled;
5. Check coolant level in reservoir tank and refill till upper limit.
6. Install reservoir tank cap.

4

Cooling System Chart



COOLING SYSTEM ASSEMBLY DISASSEMBLY/INSTALLATION



1. RADIATOR 2. FAN ASSY 3. RADIATOR RESERVE

4. WATER HOSE 1(φ6×φ10×450) 5. CLAMP（ϕ10） 6. BUFFERING COLLAR

7. BUMPERBLOCK,RADIATOR 8. CLAMP（25-38） 9. INLET PIPE,ENGINE (FRONT)

10. TIE-IN INTAKE PIPE 11. INLET PIPE,ENGINE (MIDDLE) 12. INLET PIPE,ENGINE (REAR)

13. T-JOINT, WATER PIPE 14. CLAMP（13-19） 15. CYCLE PIPE (REAR)

16. OUTLET PIPE,ENGINE (FRONT) 17. OUTLET PIPE,ENGINE (RAER)

18. BOLT,FLANGE（M6×16） 19. CYCLE PIPE (FRONT)

20. EXHAUST VALVE 21. CYCLE PIPE (FRONT)

22. BOLT(M6×20） 23. SPACER BUSH 24. WATER HOSE 2(φ6×φ10×200)

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Engine Removal and Installation…5-2
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Inspection Information

Note:

● When removal Engine, please use jack to support the bodywork. Don't damnify the frame, body of Engine, bolt and cable etc.
● Please blind up the frame when removal the engine.
● Don't removal engine from the bodywork when operating as follows:

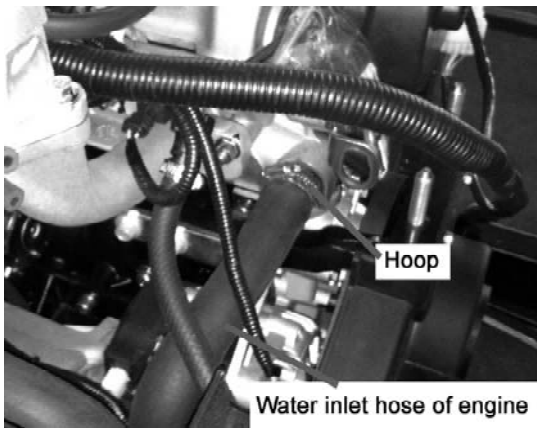
—THROTTLE VALVE BODY, AIR FILTER.
—CVT SYSTEM, CVT COVER.
—FAN COVER，ENGINE.
—IGNITION COIL
—CAMSHAFT POSITION SENSOR、CRANKCASE POSITION SENSOR
● **Following operation require removal of engine from vehicle:**
—CRANKCASE

Tightening torque:

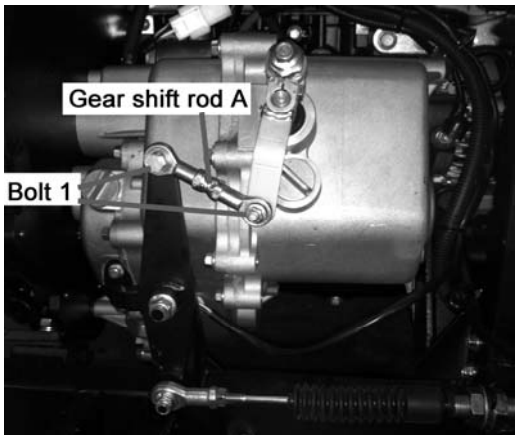
RUBBER WASHER OF ENGINE（M10×1.25）：40～50N.m
ENGINE SUPPORT A（M10×25）：40～50N·m
ENGINE SUPPORT B（M10×1.25）:40～50N·m

Disassembly Engine

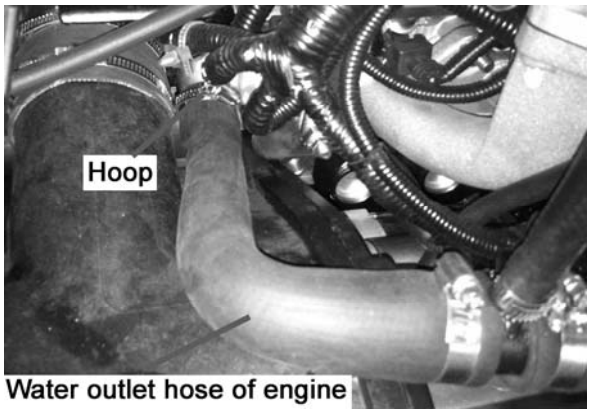
Remove cargo box.
Remove seat.
Remove plastic covers.
Remove air filter.
Remove exhaust pipe and muffler
Remove hoop.
Remove water inlet hose of engine



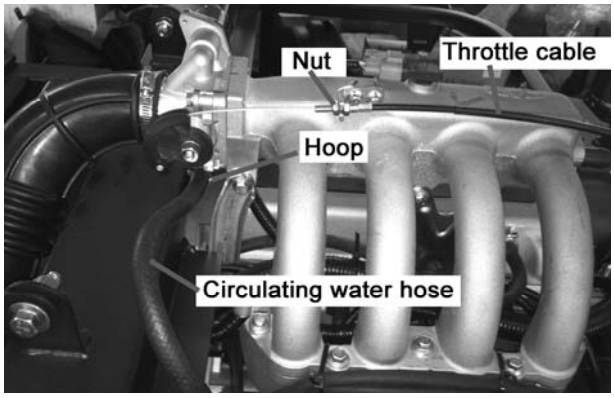
Remove bolt 1
Remove gear shift rod A.

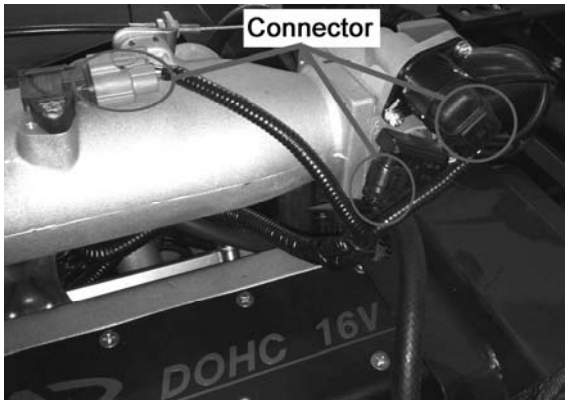


Remove hoop.
Remove water outlet hose of engine.



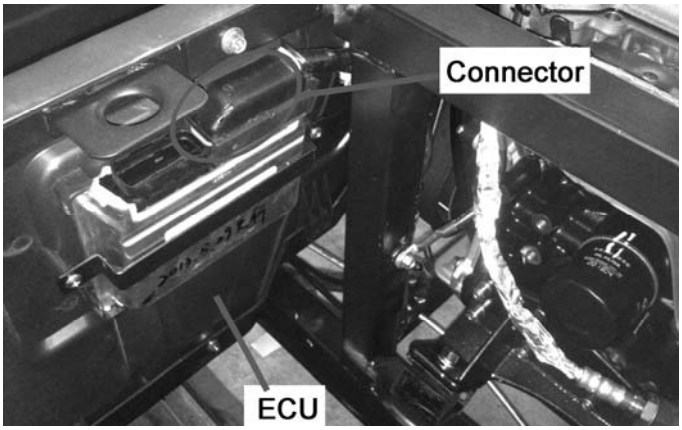
Remove nut.
Remove the throttle cable,
Remove hoop
Remove circulating water hose

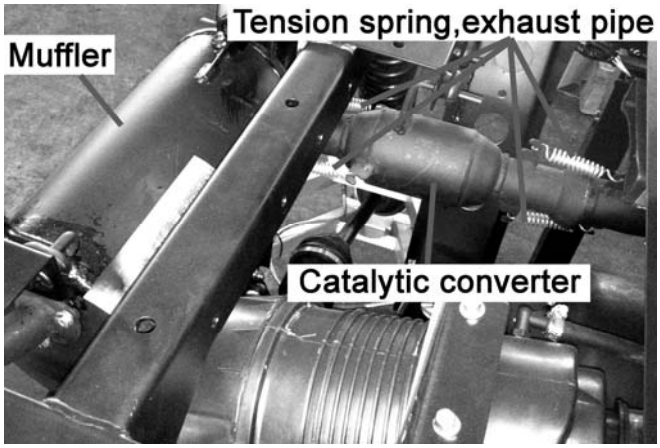




Remove all the connector of engine.

Remove the connector of ECU.



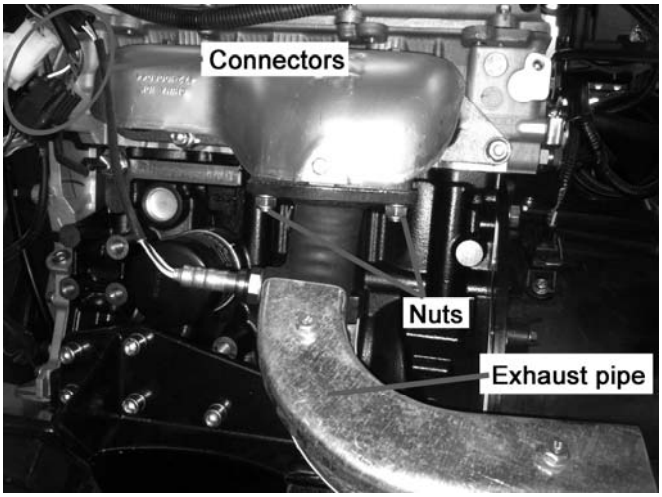


Remove tension spring of exhaust pipe.
Remove catalytic converter.
Remove muffler.

Remove the connector of oxygen sensor.

Remove two nuts.

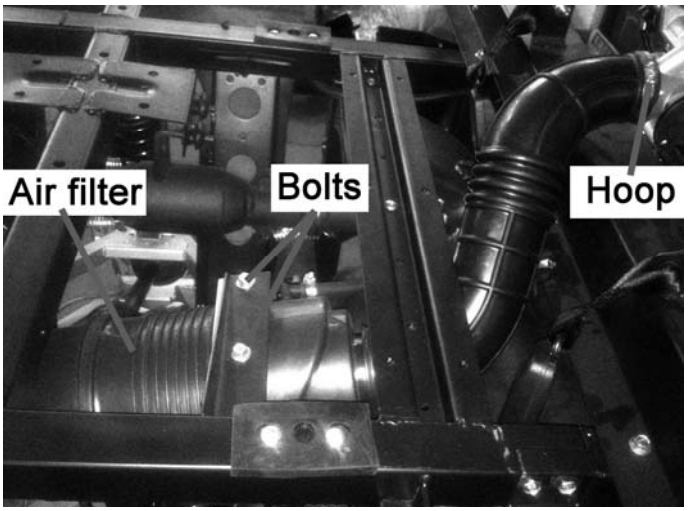
Remove exhaust pipe.



Remove hoop of air filter.

Remove two bolts.

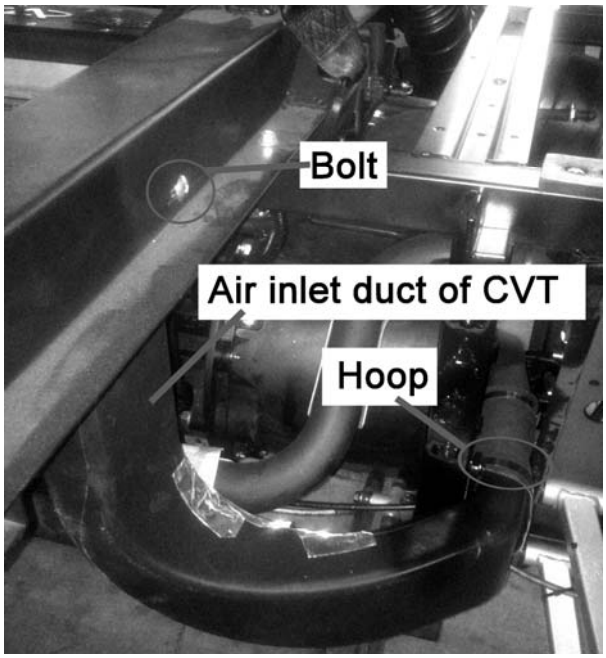
Remove air filter.



Remove hoop of air inlet duct for CVT.

Remove bolt.

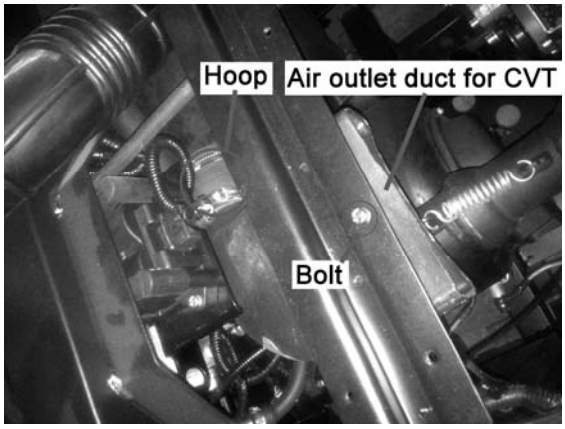
Remove air inlet duct of CVT.



Remove hoop of air outlet duct for CVT.

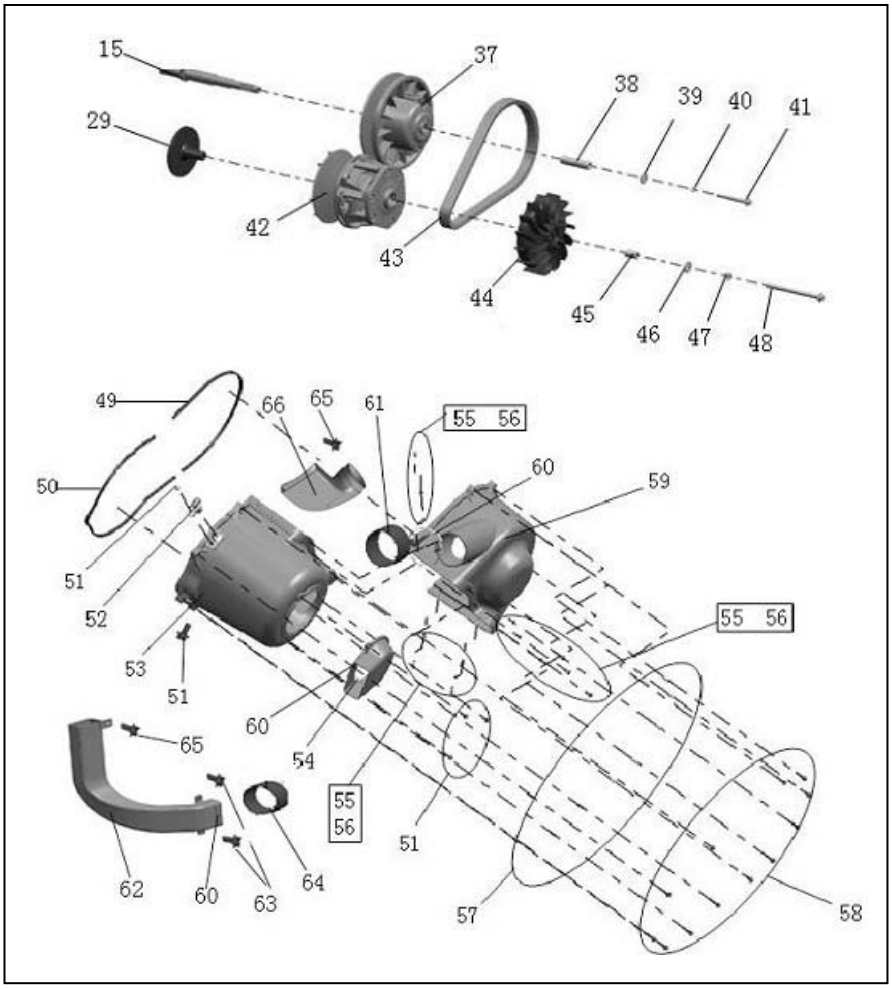
Remove bolt.

Remove air outlet duct of CVT.

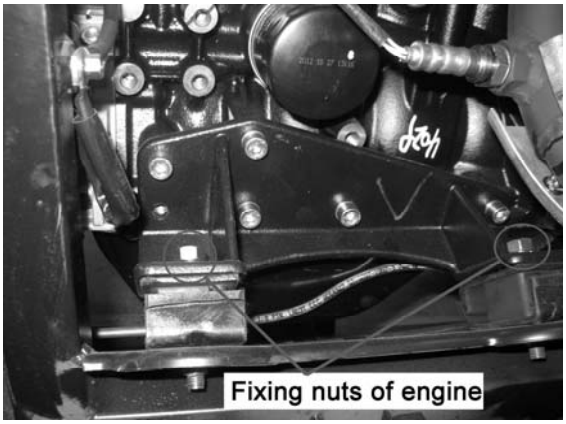


Remove the CVT disassembly/installation.

15. CVT SECONDARY SHEAVE
29. FLANGE PLATE, CVT SUPPORT
37. CVT SECONDARY SHEAVE
38. ORIENTATION COVER, SECONDARY SHEAVE
39. WASHER（φ12×φ30×2)
40. SPRING WASHER（φ10）
41. BOLT (M10×115)
42. CVT DRIVER
43. CVT BELT
44. CVT IMPELLER
45. SPACER BUSH, DRIVER
46. WASHER（φ12.5×φ30×3)
47. SPRING WASHER（φ12）
48. BOLT (M12×175)
49. SEAL, CVT COVER (LONG)
50. SEAL, CVT COVER (SHORT)
51. BOLT (M6×12)
52. CRANKSHAFT SENSOR
53. CVT COVER (LEFT)
54. JOINT, AIR INLET DUCT
55. BOLT (M6×15)
56. WASHER（φ6×φ12×1.6)
57. CVT PIN
58. BOLT (M6×25)
59. CVT COVER (RIGHT)
60. CIRCLIP (80-100)
61. RUBBER PIPE (φ85×φ92×60)
62. CVT HOSE, IMPORT WIND
63. EXPANSION SCREW(M8×20)
64. RUBBER PIPE (φ85×φ92×60)
65. BOLT(M6×20）
66. CVT HOSE, EXPORT WIND

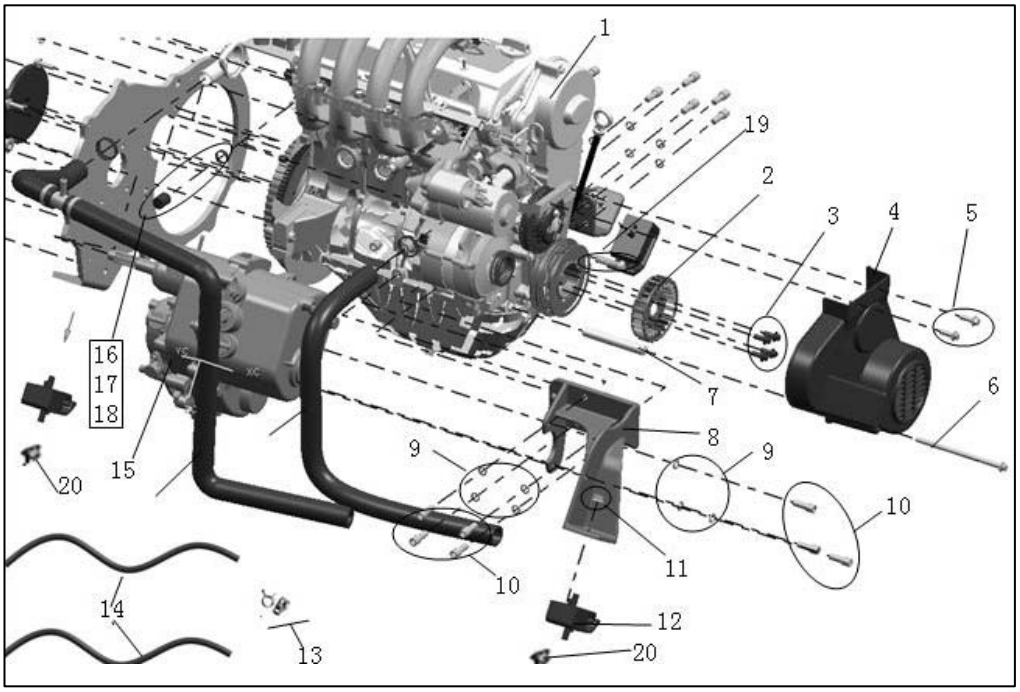


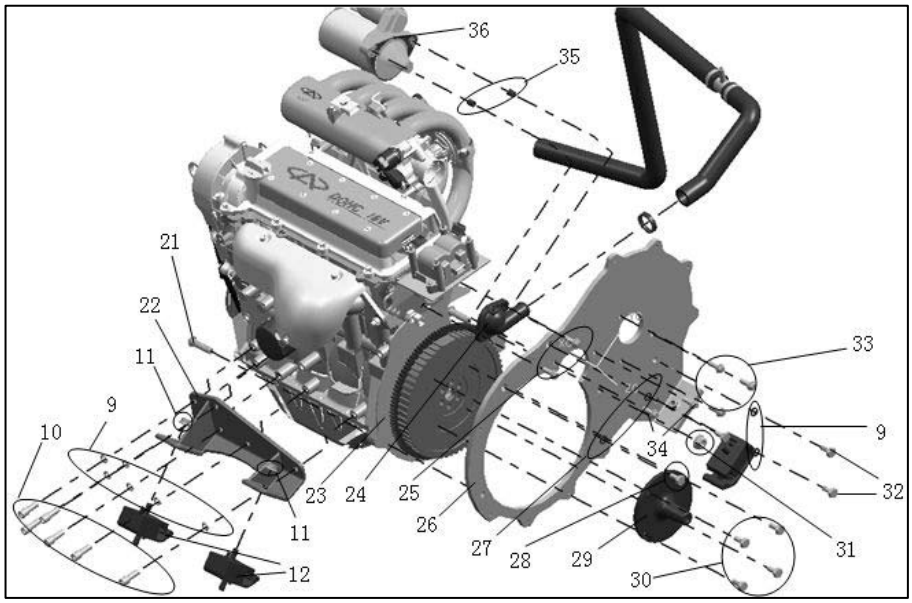
Remove fixing nuts of engine.
Remove other fixing nuts of engine as shown below.



Engine and gearbox disassembly/installation

1. ENGINE
2. FAN
3. BOLT，FLANGE（M6×16）
4. FAN COVER
5. BOLT，FLANGE（M8×16）
6. BOLT，FLANGE（M8×160）
7. SPACER BUSH
8. ENGINE SUPPORT A
9. SPRING WASHER（φ10）
10. INNER-HEX BOLT (M10×25)
11. LOCKNUT，FLANGE (M10×1.25)
12. RUBBER WASHER OF ENGING
13. CLAMP（φ10）
14. FUEL HOSEΦ6×Φ10.5×400
15. GEAR-BOX
16. COBBRA, ENGINE HOSE
17. STOPPER, ENGINE HOSE
18. CIRCLIP (16-25)
19. BOLT (M12×1.25×45)
20. LOCKNUT，FLANGE(M10×1.25)
21. BOLT，FLANGE(M12×1.25×35）
22. ENGINE SUPPORT B
23. ENVELOP BOARD, ENGINE
24. OUTLET WATER GAP, ENGINE
25. BOLT (M8×35)
26. CVT SUPPORT COVER
27. SPRING WASHER（φ12）
28. BOLT，FLANGE（M12×1.75×30）
29. FLANGE PLATE, CVT SUPPORT
30. BOLT（M10×20）
31. NUT，FLANGE(M12×1.25)
32. BOLT（M10×25)
33. BOLT，FLANGE（M8×25）
34. BOLT，FLANGE（M8×30）
35. STEEL BUSH, STARTING MOTOR
36. STARTING MOTOR



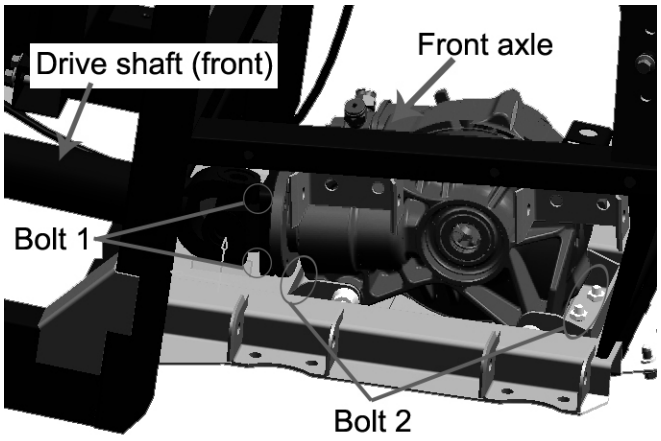


Removal and Installation of Front and Rear Axle

Support the vehicle with jack, make sure the vehicle will not fall.
Remove:
--Plastic parts for frame (→Chapter 2)
--Front and rear wheels and arms(→Chapter 8、Chapter 9)
--Air filter (→Chapter 5)
--gearbox (→Chapter 5)
--Engine (→Chapter 5)
-- Front and rear brake caliper
(→Chapter 8、Chapter 9)

Remove front axle.

Remove bolt 1.
Remove drive shaft (front).
Remove bolt 2.
Remove front axle



Installation

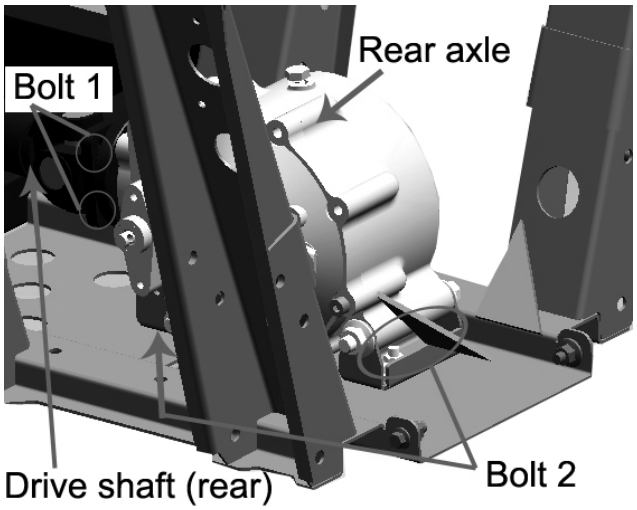
Installation as contradictorily process of remove.

Bolt torque of front axle(M8): 23-25N·m
Bolt torque of front axle(M10): 45-50N·m

Bolt torque of front drive shaft (M8): 23-25N· m

Remove rear axle.

Remove bolt 1.
Remove drive shaft (front).
Remove bolt 2.
Remove front axle



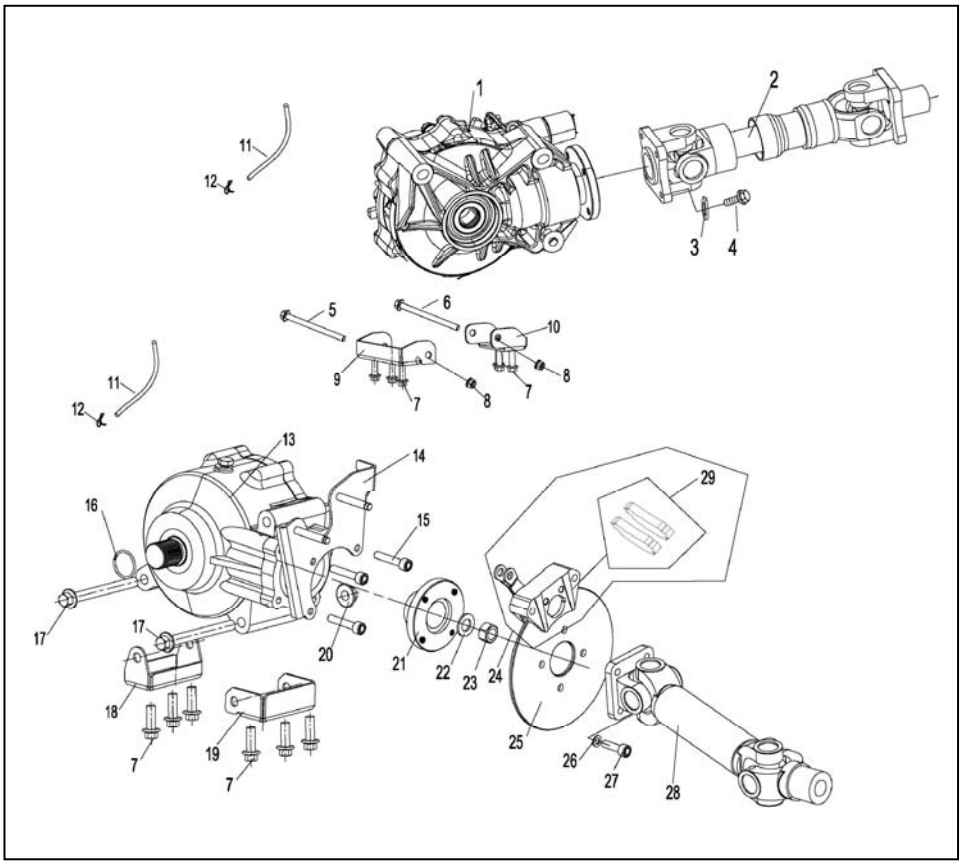
Installation

Installation as contradictorily process of remove

Bolt torque of rear axle (M8): 23-25N·m
Bolt torque of rear axle (M10): 45-50N·m

Bolt torque of rear drive shaft (M8): 23-25N· m

Front and rear axle assy disassembly/installation



1. FRONT AXLE
2. FRONT DRIVE SHAFT
3. SPRING WASHER（φ8）
4. BOLT (M8×25)
5. BOLT,FLANGE(M10×1.25×145）
6. BOLT,FLANGE(M10×1.25×85）
7. BOLT，FLANGE（M8×16）
8. LOCKNUT，FLANGE(M10 × 1.25)
9. HOLDER,FRONT AXLE(FR)
10. HOLDER,FRONT AXLE(RR)
11. AIR HOSE, AXLE(φ6×φ8×450)
12. CLAMP（ϕ10）
13. REAR AXLE
14. SUPPORT,PARKING CALIPER
15. BOLT(M8×45)
16. CIRCLIP(φ32)
17. BOLT，FLANGE（M12×1.25×115）
18. SUPPORT,REAR AXLE (R)
19. HOLDER,REAR AXLE(RR)
20. LOCKNUT，FLANGE(M12×1.25)
21. COUPLING FLANGE
22. WASHER(φ14×φ28×2)
23. NUT(M14×1.25)
24. PARKING DISC
25. PARKING CALIPER
26. SPRING WASHER（ϕ8）
27. BOLT(M8×30)
28. REAR DRIVE SHAFT
29. PARKING DISC PAD

6

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Chapter 1. Reading Instruction

1) Reading Method of Maintenance Instruction

1.1 Auxiliary Materials

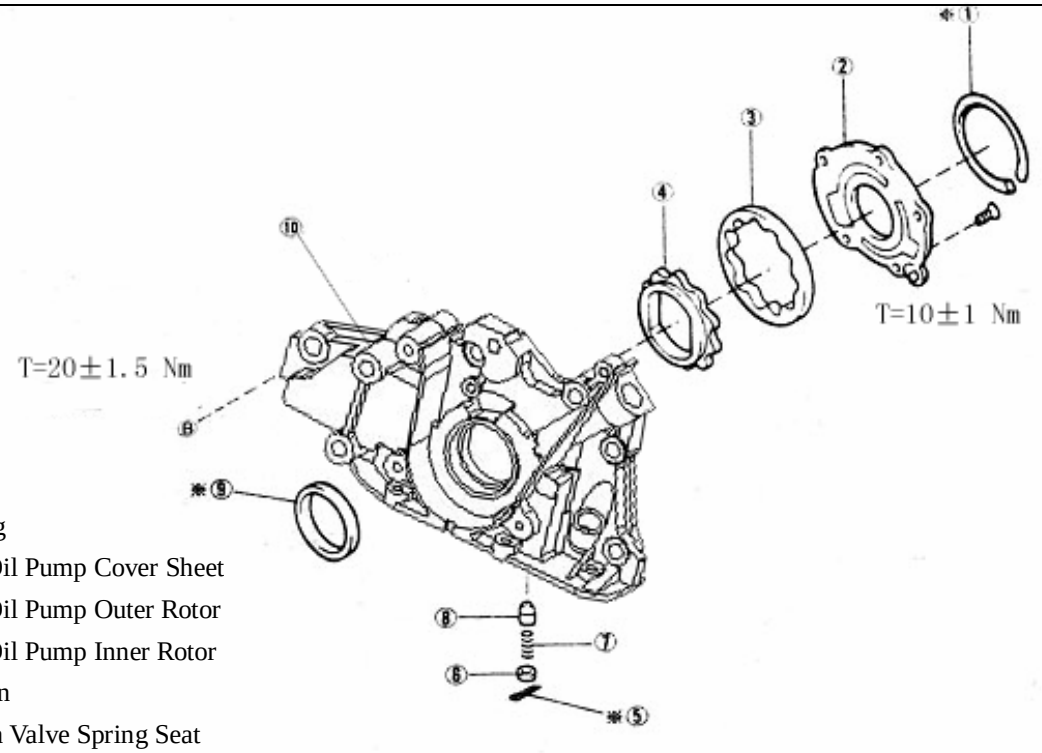
If it is required in the operation instruction to prepare the auxiliary materials such as special tools, tools, measuring instruments and grease in advance, you should list all auxiliary materials required in a table before carrying out each operation.

Since the ordinary tools, lifter and spare parts are conventional materials used in the maintenance, they are omitted here.

1.2 Operating Sequence and Structure Diagram

(1) The diagram of structure and components, name of components and installation status are set forth at the beginning of each chapter or section.

(2) The number in the figure refers to the disassembly sequence of each component. The components which may not be reused and the tightening torque are indicated in the figure.



① Seal Ring
② Engine Oil Pump Cover Sheet
③ Engine Oil Pump Outer Rotor
④ Engine Oil Pump Inner Rotor
⑤ Cotter Pin
⑥ Oil Drain Valve Spring Seat
⑦ Oil Drain Valve Spring
⑧ Slide Block
⑨ Crankshaft Front Oil Seal
⑩ Engine Oil Pump Housing

※: Components which may not be reused

Unit: N·m(kg·cm)

1.3 Content Omitted in this Manual

The following operating procedures have been omitted in this Manual, and they should be carried out in the actual operation:

(1) Operation relating to the lifter and the small-sized elevator;

(2) Cleaning and wipping of common components;

(3) Relevant visual inspection.

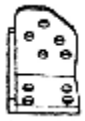
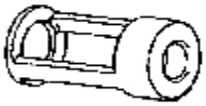
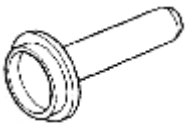
1 .4 Definitions

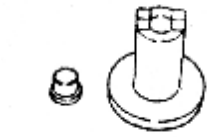
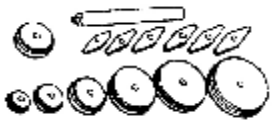
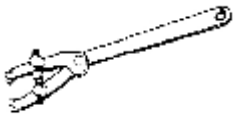
Standard value	Refers to allowed value during inspection, maintenance and adjustment.
Limit	Refers to the maximum or minimum value that should not be exceeded during inspection, maintenance and adjustment
Reference	Set the standard value for simple measurement to prevent from its measuring difficulty and inconsistency to facts.
Difference	Refers to the difference between maximum value and minimum value.
Notice	It carries the cases of damaging the vehicle and parts so you should pay attention to the operation description.
Warning	It records the operation descriptions of cases about person accident.

2) Meaning of Marks and Abbreviations

Mark	Original Words	Intepretation
RH	Right Hand	Right Hand
LH	Left Hand	Left Hand
FR	Front	Front
RR	Rear	Rear
IN	Intake	Intake
EX	Exhaust	Exhaust
SAE	Society of Automotive Engineers	Society of Automotive Engineers
API	American Petroleum Institute	American Petroleum Institute
SPECIAL TOOL	Special Tool	Special Tool
T	Torque	Torque
Ay	Assembly	Assembly
S/A	Sub Assembly	Sub Assembly
W/	With	With
M/T	Manual Transmission	Manual Transmission
A/T	Automatic Transmission	Automatic Transmission
T/C	Turbo Charger	Turbo Charger

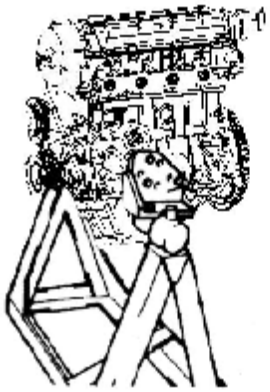
3) Special Maintenance Tools:

	Outside view	Name or symbol	Purpose
		Engine disassembly and inspection auxiliary device	Mount on the engine service stand
		Engine service stand	Disassembly and assembly of engine
		Clamp hole wrench for camshaft timing gears	Disassembly of camshaft timing gears
		Spring bushing puller	Assembly of camshaft Oil seal
		Valve keeper remove tool	Assembly and disassembly of valve spring retainer lock
		Auxiliary tools	
		Flywheel clamp	Assembly and disassembly of crankshaft gear
		Valve guide punch pin	Disassembly and assembly of Valve guide
		Axial Oil seal replacing device	
		Oil seal base drive	

	Outside view	Name or symbol	Purpose
		Piston pin puller	Disassembly and assembly of piston pin
		Embeded combination oil seal and helical gear puller	Installation of oil seal
		Crankshaft pulley holding tool	Disassembly and assembly of crankshaft pulley
		Wrench	Disassembly and assembly of crankshaft driven gear
			Replace valve clearance adjustment gasket
		Water pump pulley locking wrench	Assembly of coolant pump
Measuring tools	Feeler gauge. Micrometer caliper. Ruler. Dial gauge. Cylinder gauge. Caliber. Pressure gauge. Torque wrench torque wrench		
Tool	Piston ring extractor		
Oil	Engine Oil, adhesive		

Chapter 2. Disassembly, Assembly and Maintenance

Disassemble or assemble the engine with roll over stand.
Disassemble or assemble the engine parts on the roll over stand.



1) Timing Belt

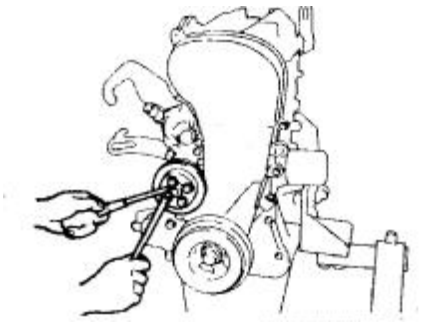
1. Structure Diagram

① Water pump pulley
② Timing shroud
③ Timing belt
④ Torsional damper
⑤ Timing belt back plate
⑥ Tension pulley
⑦ Camshaft timing pulley

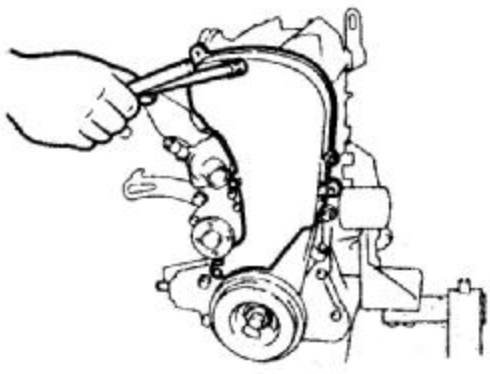
※: Components which may not be reused.
Unit: N·m(kg·cm)

2. Disassembly

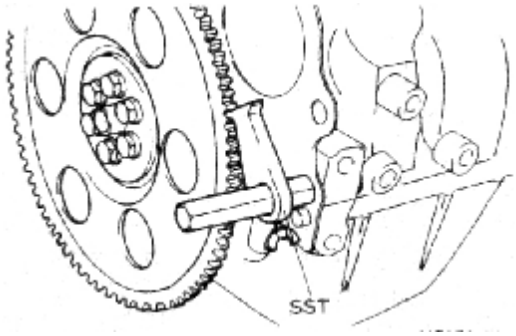
2.1 Remove the water pump pulley as the view showing.
It will be better of disassembling with special tool.
Torque: 25±1.5 N.m



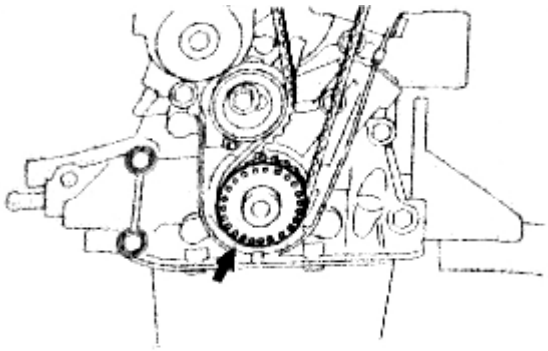
2.2 Disassembly of Timing Belt Cover
Torque: 6±1N.m



2.3 Disassembly of torsional damper
Use special tools to prevent the gear ring from rotating. When disassembling the fixing bolts of the torsional damper, make sure that the marks on the crankshaft timing pulley match with the timing marks on the engine oil pump.

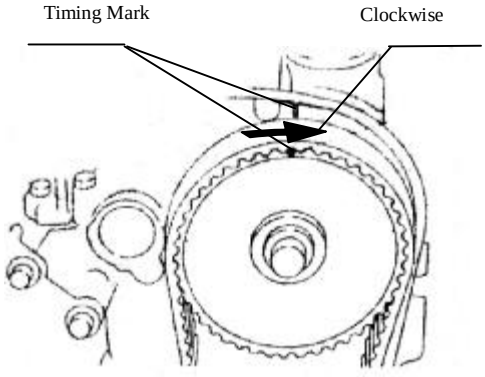


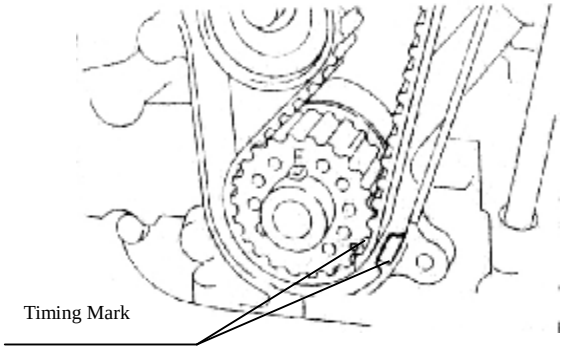
2.4 Remove the timing belt back plate.



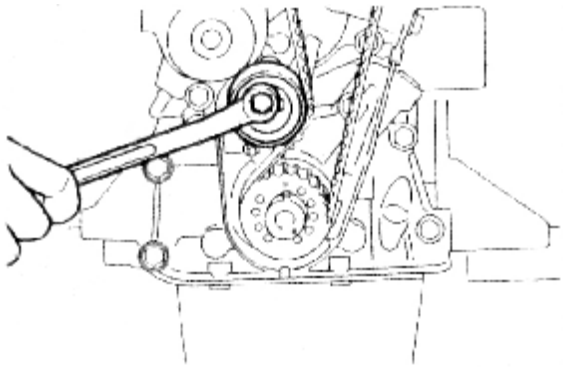
2.5 Disassembly of tension pulley

2.5.1 Compress the top dead center at the first cylinder piston. After disassembly of timing cover, pull the bolt and clockwise rotate the timing gear with wrench. And then align the timing mark of camshaft timing gear and the raised mark on camshaft cover;





2.5.2 Screw off the bolt of tension pulley and remove the tension pulley.

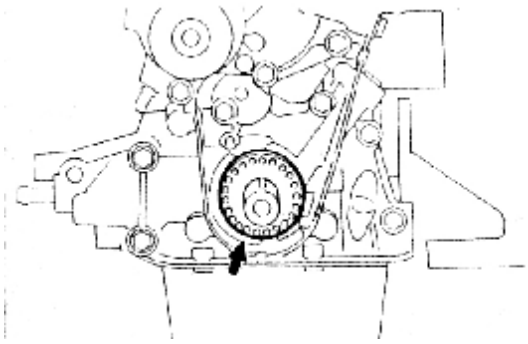


2.6 Disassembly of timing belt

Notice: Do not use sharp tools like screwdriver during disassembly of belt.

Notice: Pay attention to the following items during using the timing belt:

- Do not bend the belt with small angle, or the rigging in belt will break.
- Do not pollute grease and water because the using expectancy of belt is short.
- Only clockwise rotate the engine after mounting the belt.



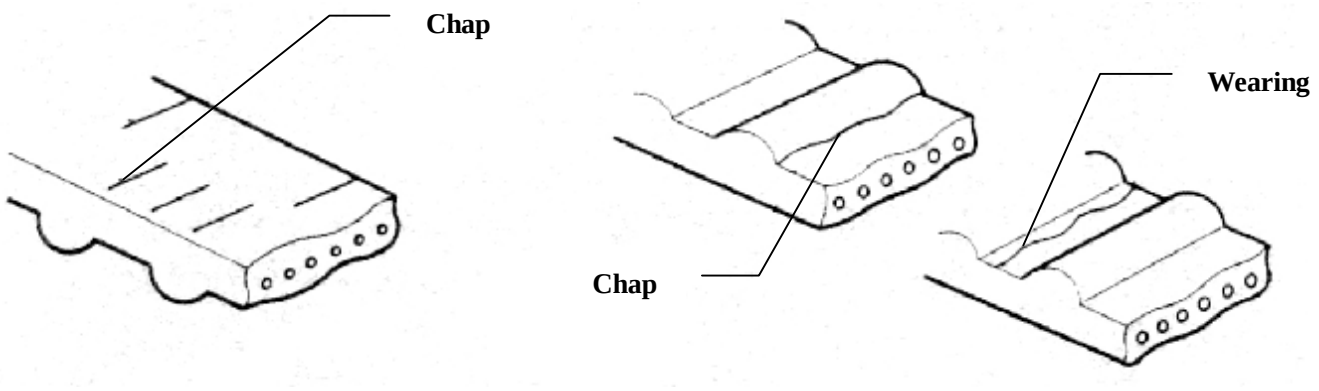
2.7 Disassembly of crankshaft timing gear

2.8 Inspect the timing belt carefully, and replace new components under any of the following circumstances or when the mileage is up to the conditions of replacement:

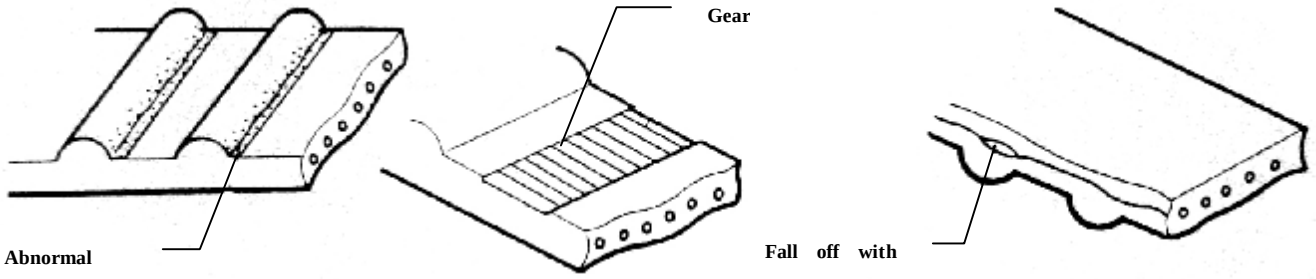
2.8.1 Chap of back-side rubber

2.8.2 Chap of dedendum, chap of separated cord fabric.

2.8.3 Wearing, gear missing and incomplete gear of cord fabric.



2.8.4 Abnormal wearing of belt flank.



2.8.5 Notice: Replace the belt as any following situation occurs, even though abrasion cannot be found directly:
The water pump leaks water out, and requires continuing infusion.If the belt is spotted with much oil stains, and the rubber may be damaged due to expansion, you should replace the belt.

Timing belt model and type

Part number	372-1007081
Width of belt	25.3mm

Tension Pulley of Timing BeltRotate the bolt of tension pulley bracket and hear if it is noisy; check the contacting surface and look if it is damaged.Model and type of tension pulley of timing belt

Part number	372-1007030
Width	27.0 mm
Outer diameter	φ50mm

Check if the out is damaged.Timing belt model and type

Type / Item	EF
	GL, ZL, GS, ZS
Camshaft timing pulley diameter(mm)	$\varphi 110.7^{+0.1}_{-0.2}$
Camshaft timing pulley diameter(mm)	$\varphi 54.65^{+0.7}_{-0.13}$

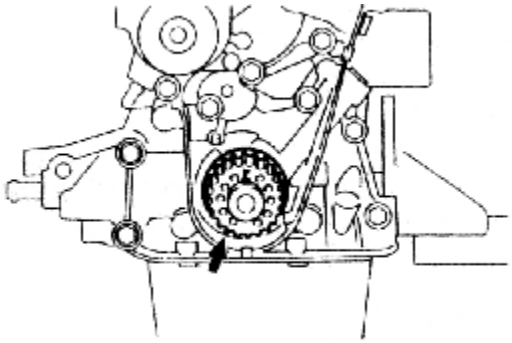
Check the timing belt back plate for any deformation.

Standard size of crankshaft timing gear

Width	28.6mm

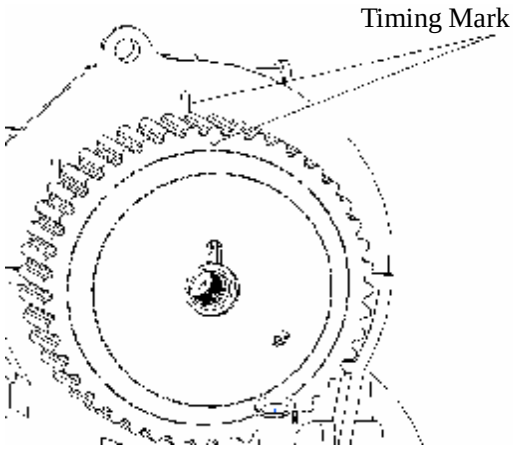
3. Installation

3.1 Assembly of crankshaft timing pulley.

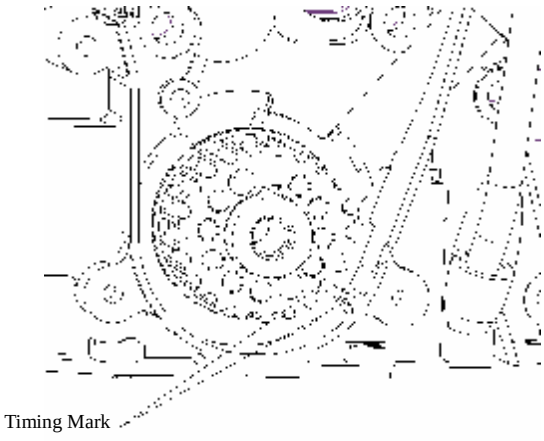


3.2 Installation of timing (at the top dead center of the first cylinder piston)

3.2.1 Put the camshaft timing gear on the front end of the exhaust camshaft, align the locating slot on the gear with the locating pin on the end of the camshaft, and then fix the timing gear with bolts. The tightening torque for the bolts is 100±5Nm.



Make sure that the clashing mark of crankshaft timing pulley aligns with the mark of oil pump.

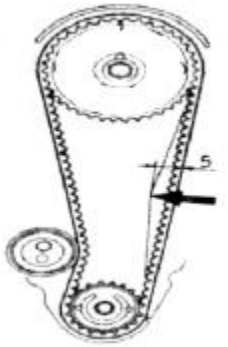


3.3 Install the tension pulley. After adjust the tension of timing belt, install the tension pulley bolt and tighten it with the torque specified. Adjust the tension of the timing belt acording to the following instruction, and install the tension pulley.

3.3.1 As indicated in the figure, make the tensioner swing to the right with a screwdriver so that the distance between the edge of the tension pulley and the circular arc of the water pump body is 8mm, and then tighten the tension pulley bolts with the torque of 25±3Nm.

3.3.2 Rotate the crankshaft along the rotating direction of the engine for 2 rounds so that the timing mark on the timing gear of camshaft and crankshaft is matched respectively, and then tighten the crankshaft belt pulley bolts.

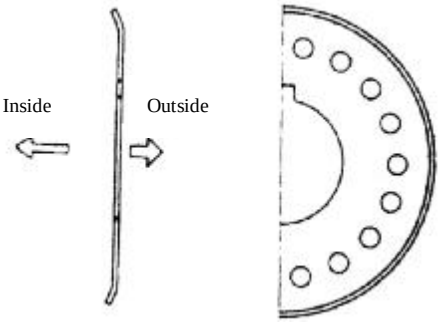
3.3.3 The force required to press down the central position between the 2 pulleys at the in-tension side of the timing belt for about 5mm is:



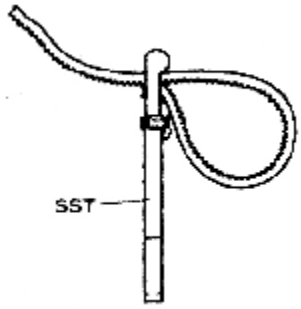
［Reference］ 19.6-29.4N(2.0-3.0kg)

Notice: when the deflection can not reach the standard, it is necessary to adjust the fixing bolt of tension pulley mentioned above.
Tighten the fixing bolt of the tension pulley with the torque as specified. The tightening torque is 25±3N.m

3.4 Assembly of Timing Belt Back Plate.
Notice: Install the timing belt back plate in the direction as indicated in the right figure.

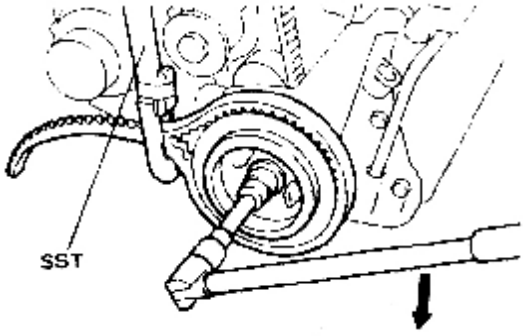


3.5 Install the torsional damper with special tools.
3.5.1 Without flywheel
3.5.1.1 Hitch the part of crankshaft pulley with the belt of special tool.



3.5.1.2 Hold on the handle of the special tool and prevent the toothed belt from rotating. Tighten the bolts with the specified torque.

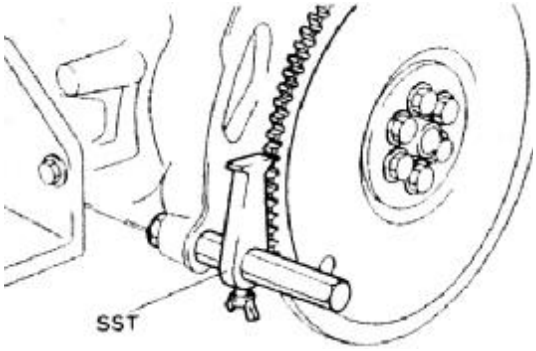
Torque: 98.0±10N.m{10±1kgm}



3.5.2 With flywheel

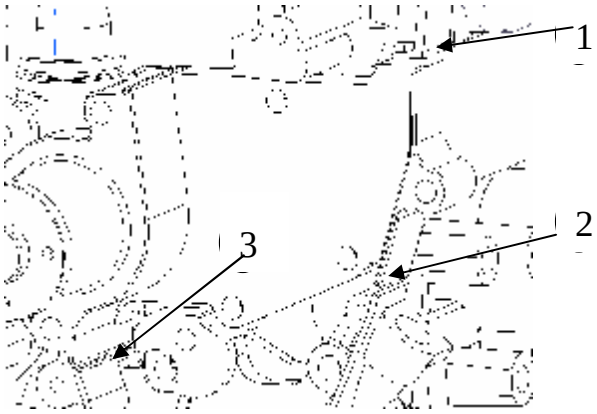
3.5.2.1 Prevent the gear from rotating with special tool.

3.5.2.2 Then screw down the bolt of torsional damper.



3.6 Assembly of timing cover.

Mount the sealing strips at the positions as indicated in the right figure. The sealing strips at the position 1 and 2 should be mounted before the assembly of the cylinder head assembly, and the sealing strip at the position 3 should be mounted before tightening the water pump.

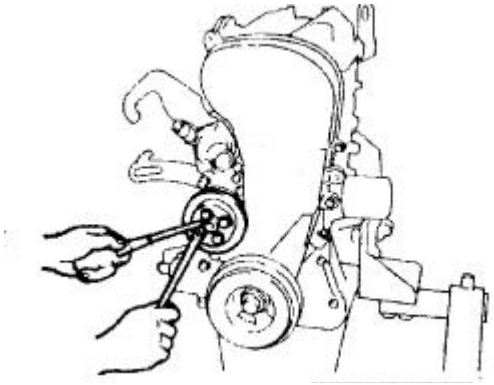


Install the timing cover, screw in the bolts with hand and then tighten them.

Torque: 6±1N.m

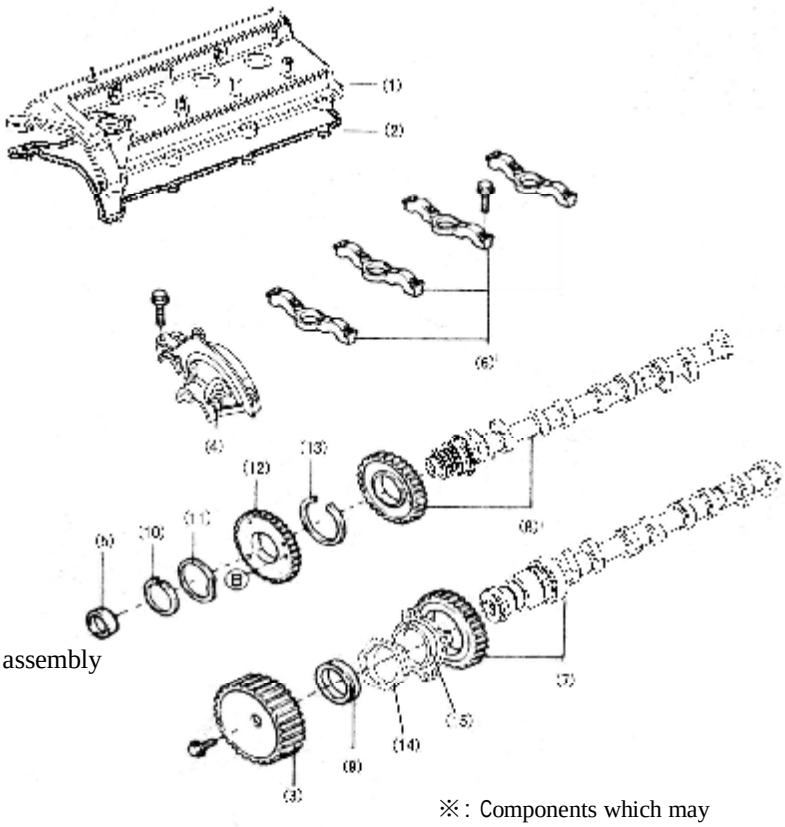
3.7 Installation of water pump pulley.

Torque: 6±1N.m



2) Camshaft

1. Structure Diagram



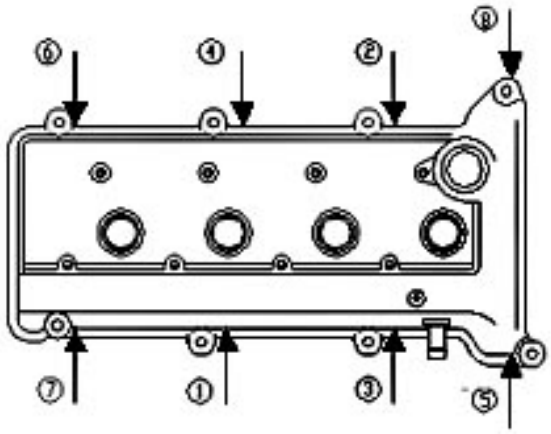
(1) Cylinder head chamber cover assembly
(2) Cylinder head cover gasket
(3) Camshaft timing belt
(4) Camshaft cover
(5) Blanking cover
(6) Camshaft bearing cap
(7) Exhaust camshaft assembly
(8) Intake camshaft assembly
(9) Camshaft oil seal
(10) Axial spring retainer ring
(11) Saddle washer
(12) Intake camshaft sub gear
(13) Transmission ring

※: Components which may not be reused

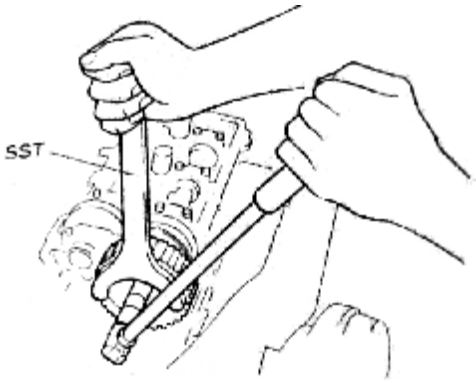
Unit: N·m(kg·cm)

2. Disassembly

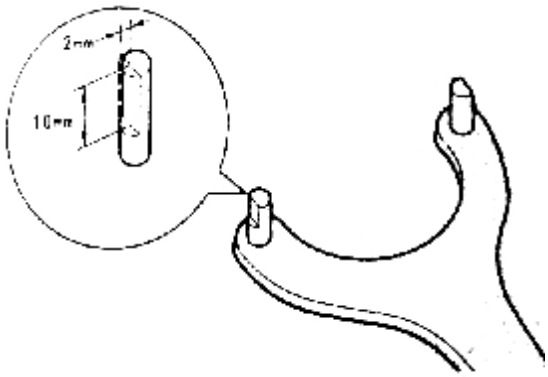
2.1 ① Cylinder head chamber cover assembly;
② Disassembly sequence of cylinder head chamber cover;



2.2 Remove the camshaft timing gear with special tool.

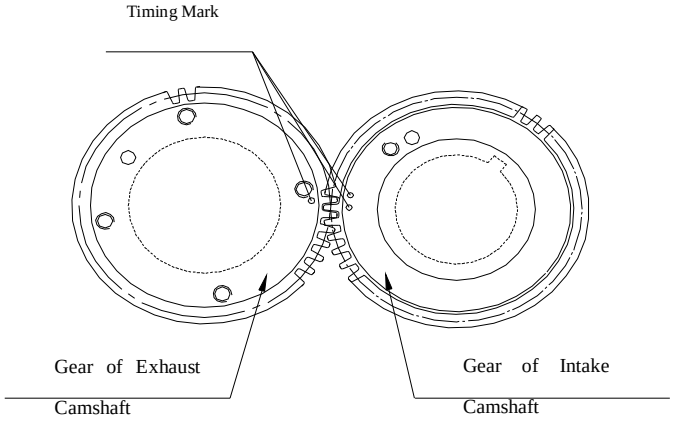


Notice: ·The special tool should be made as indicated in the right figure.
·Use the special tool to prevent the camshaft from rotating.



2.3 Remove the camshaft bearing cap

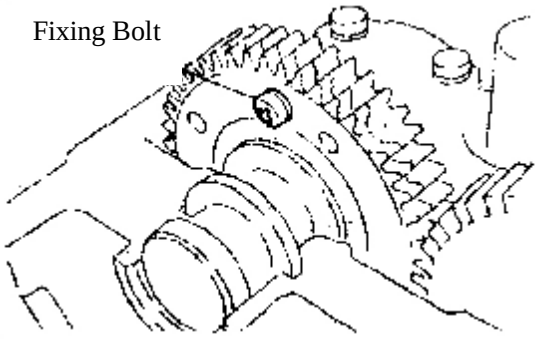
2.3.1 The marks on the camshaft gear should match with each other as indicated in the right figure.



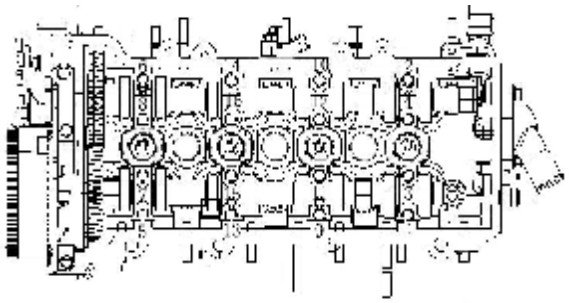
2.3.2 Position the main sub gear on intake camshaft with bolts, as can be seen from the right picture.

Notice: In order to eliminate the radial force of the camshaft, the camshaft should be kept at the horizontal position in the course of disassembly so as to prevent the damage caused by the excessively high radial force.

Fixing Bolt



2.4 Disassemble the bolts in the order as indicated in the right figure, and then disassembly the camshaft bearing cap.



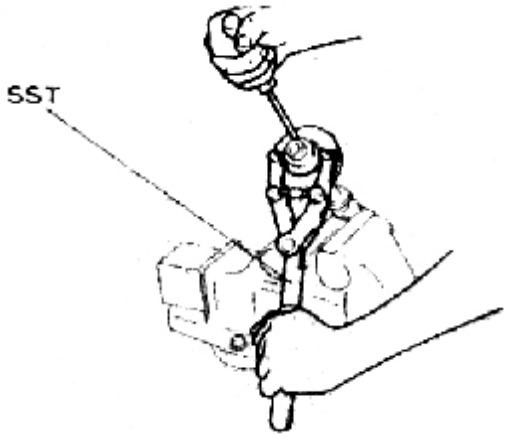
2.5 Remove the spark plug

2.6 Disassemble the sub gear of the camshaft.

2.6.1 If using the special tools, operate as indicated in the right figure.

Clamp the camshaft and plug the pins of special tool into the hole on gear; rotate the gear to keep the meshing of driven gear and driving gear, and then remove the fixing bolt of driven gear.

Notice: The surface of the camshaft may not be damaged.



2.6.2 If not using the special tools, operate as indicated in the right figure.

(1) Screw M6 bolts onto the sub gear of the intake camshaft at the position as indicated in the right figure.

(2) Use the screwdriver to turn the gear as indicated in the figure, and disassemble the fixing bolts of the sub gear.

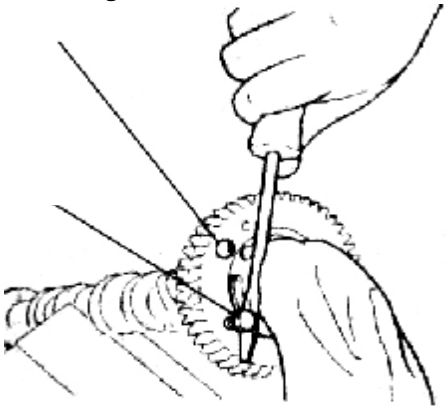
Notice: The surface of the camshaft may not be damaged.

(3) Disassemble the axial elastic retainer ring with tensioner and remove the saddle spring washer, transmission ring, and so on.

2.7 Camshaft

For Fixing

Bolt



2.7.1 Measure the camshaft with micrometer caliper. If it is below to the specified limit, replace with a new one.

Camshaft journal Unit: mm

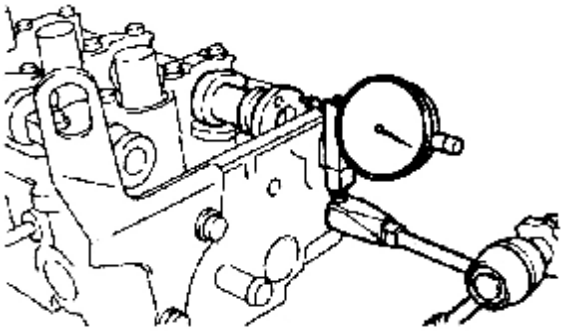
Item \ Type		EF	
		ZL, RL	GL, GS, ZS
Standard value	IN	$\varphi 23.0^{-0.02}_{-0.033}$	
	EX	$\varphi 23.0^{-0.02}_{-0.033}$	
Limit: 0.10	IN	φ22.9	
	EX	φ22.9	

2.7.2 Inspection of camshaft axial clearance

(1) Replace the camshaft when the axial clearance value measured with dial gauge exceeds the standard value.The axial clearance of intake camshaft is 0.1~0.170mm.

The axial clearance of exhaust camshaft is 0.1~ 0.173mm.

Limit: 0.18mm.



2.7.3 Inspect the clearance of the engaging tooth of camshaft

(1) Install the camshaft into the cylinder head.

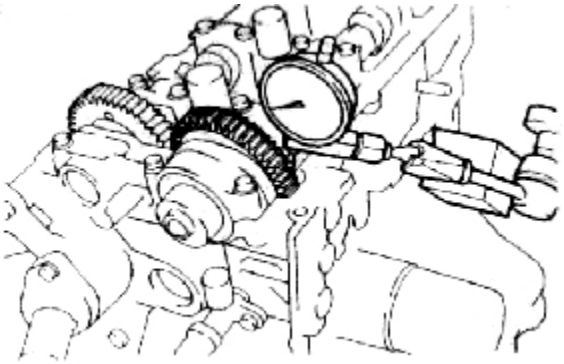
(2) Confirm the mark forwards on the bearing cap as well as the axle number, and then tighten the bolts.

(3) Measure the clearance of engaging tooth of the intake camshaft with dia indicator.

Notice: ·Measure at 4 points on the circle of the piston

·Turn the intake camshaft with special tools.

·Make sure that the marks on the driven gear and the driving gear of the camshaft match with each other.



Inspect the clearance of the engaging tooth of camshaft:

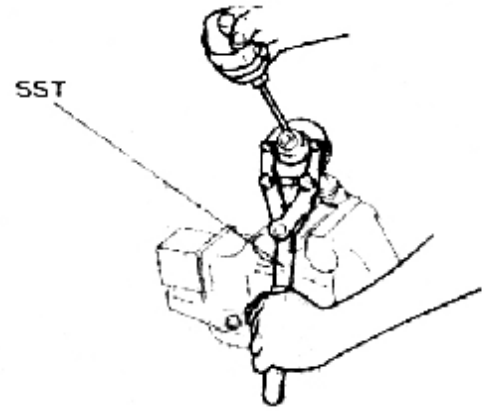
Item	Standard value	Limit
Single tootj	0.04-0.13	0.30

3. Installation

3.1 Under the circumstance that special tools are used:

3.1.1 Fix the 2 holes (φ6) of the camshaft gear assembly with special tool.

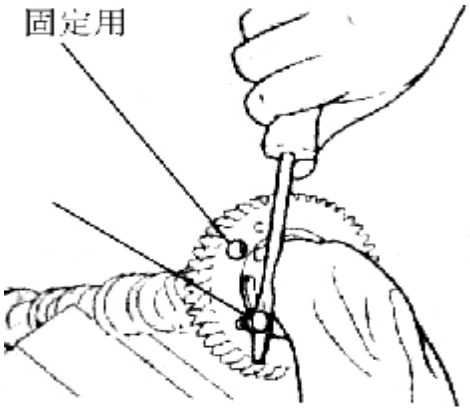
3.1.2 Rotate the driven gear to the right with special tool and tally the mark hole of driven gear with that of camshaft driving gear, or their marking way complies with each other, fix the driven gear with bolts.(Thread: M5; Thread pitch: 0.8)



For Fixing

3.2 Under the circumstance that special tools are not available:

3.2.1 Screw the M6 bolts into the camshaft driven gear at the position indicated in the right figure. Insert a screwdriver into the gap between the M6 bolt and the camshaft journal and trun the driven gear rightwards so that the fitting mark of the 2 gears match with each other or the tooth head of the 2 gears accord with each other, and then fix the driven gear with bolts (M5×0.8).



Notice: Don't damage the journal, adjust the operation.

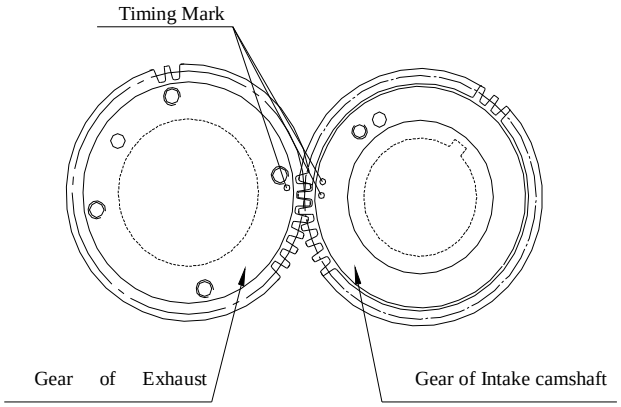
3.3 Assembly of camshaft

Notice: Pay attention to the axial clearance of the camshaft

3.3.1 Spread grease on the gear of camshaft and the axial of cylinder head.

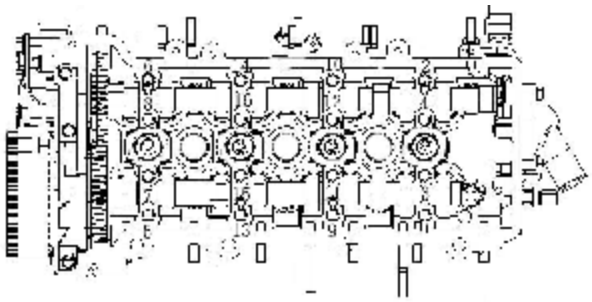
3.3.2 Remove the fixing bolts for camshaft driven gear after mounting the camshaft.

3.3.3 Mount the camshaft, align the timing mark as can be seen from the right picture

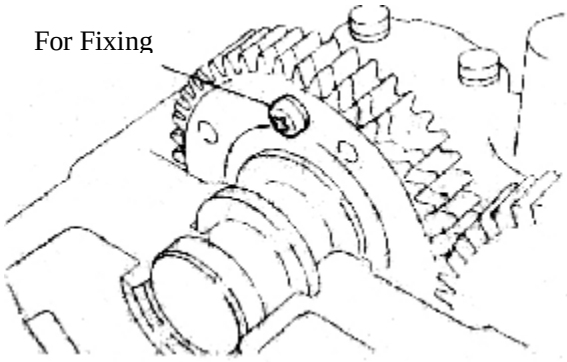


3.3.4 Spread oil fully on the cam of camshaft assembly, gears and axial of cylinder head.

3.4 Tighten the camshaft bearing cap by the order of right picture.

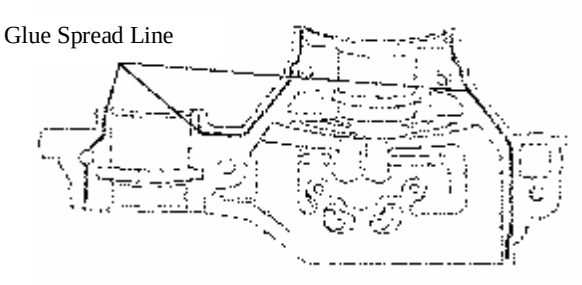


3.5 Screw off the fixing bolts for driven gear of intake camshaft assembly.



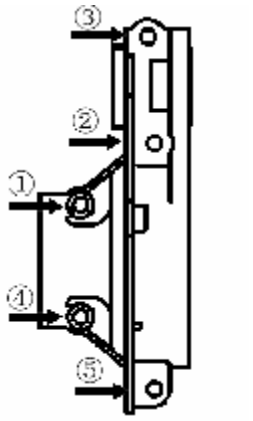
3.6 Assembly of camshaft cove

Spread sealant on the position (slot) of camshaft cover as can be seen from the right picture.



3.6.1 Assembly of Camshaft Cover

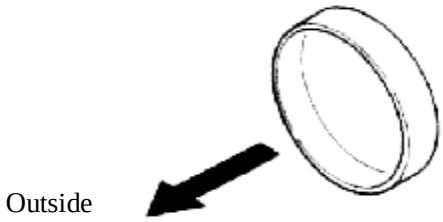
Tighten the bolts in the order as indicated in the right figure and with the specified torque.



3.6.2 After spreading oil on the blanking aperture of cylinder head and the mounting surface of blanking cover, press the blanking cover with special tool.

Notice:· The blanking cover should be installed in the direction as indicated in the right figure.

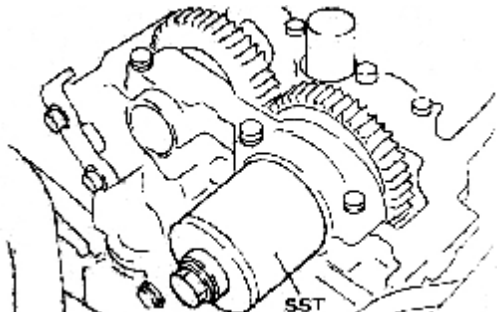
· After being pressed, the blanking cover should be 1±1mm higher than the surface of thecylinder head.



3.7 Spread the edge of the camshaft oil seal with oil, and press it into the cylinder head with M10 bolt (length: 50-60mm) and special tools.

Notice:· If the oil seal is reused, spread it with oil before pressing it into the cylinder head.

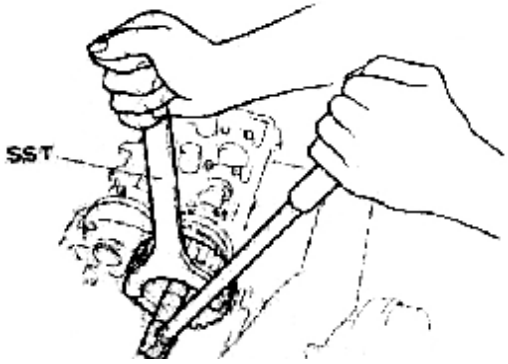
· After removing the bolt, knock it with hand so as to inspect and confirm it.



3.8 Assembly of camshaft timing gear

After spreading sealant on the bolt, prevent it from rotating with special tool and screw down the bolt of camshaft timing gear in specified torque.

Torque: 100±5N.m



Notice: Process the special tools as indicated in the right figure before using them.

3.9 Installation of cylinder head cover

3.9.1 The old cushion of the timing belt cover which contacts the cylinder head cover should be removed completely.

3.9.2 Put the new cushion into the gloove of the timing belt cover accurately.

3.9.3 Mount the cylinder head cover on the cylinder head, and tighten the 8 bolts in the order as indicated in the right figure and with the specified torque.

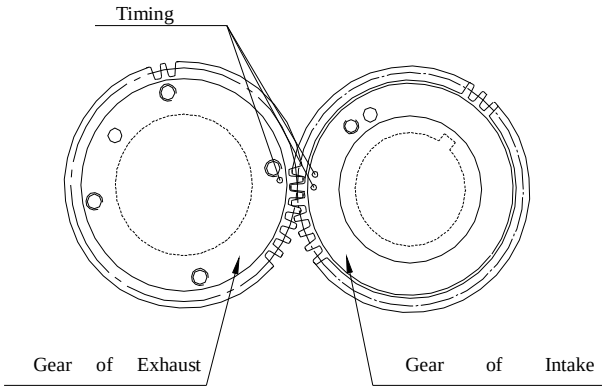
Torque: 6±1N.m

4 Inspection of valve

4.1 Standard valve clearance:

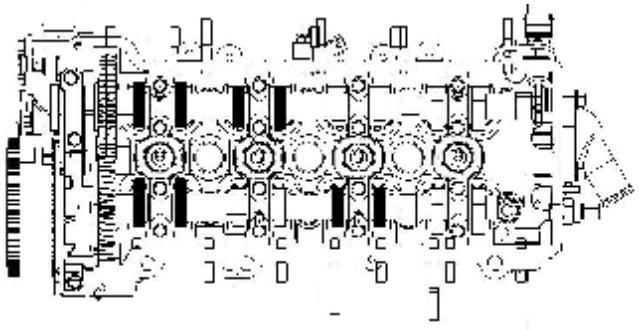
Valve clearance	IN	0.18±0.05
	EX	0.25±0.05

4.2 Make sure that the timing mark on the camshaft driving gear is aligned with that on the camshaft driven gear.

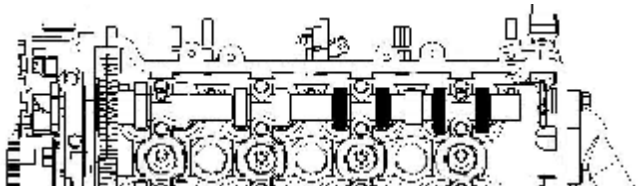


4.3 Inspect the valve clearance as specified in the figure below with the feeler gauge

Cylinder 1		Cylinder 2		Cylinder 3		Cylinder4	
IN	EX	IN	EX	IN	EX	IN	EX
O	O	O	—	—	O	—	—



4.4 Rotate the camshaft for a round to the position as indicated in the figure, and then measure the valve



clearance once again:

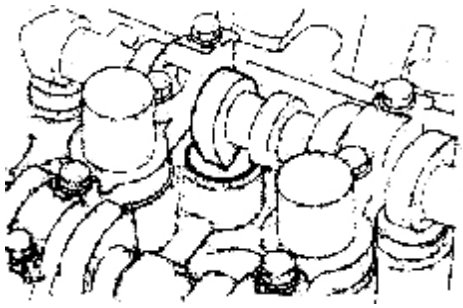
Cylinder 1		Cylinder 2		Cylinder 3		Cylinder 4	
IN	EX	IN	EX	IN	EX	IN	EX
—	—	—	O	O	—	O	O

If the clearance exceeds the standard value, adjust it by replacing the adjustment gasket.

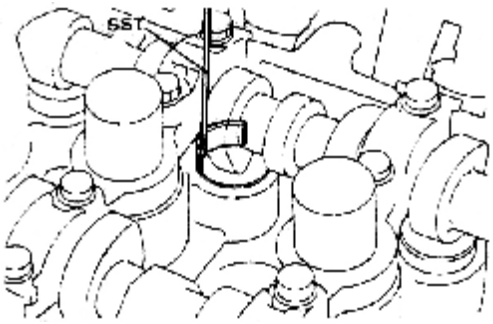
Notice: The position at which the measurement result exceeds the standard value as well as the measurement result should be recorded.

4.4.1 Rotate the camshaft and make the cam head of the cylinder which exceeds the standard value faces upwards and the opening of the valve tappet face inwards.

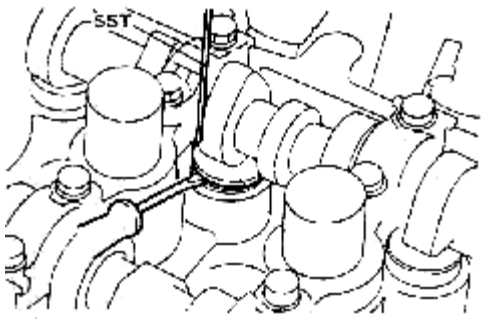
4.4.2 Rotate the crankshaft and press down the valve tappet with the crown head of the cylinder cam.



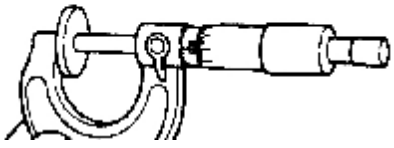
4.4.3 As indicated in the right figure, put special tools on and around the valve tappet from the inside of the cylinder head, and then rotate the crankshaft so that the crown head of the cam face upwards. Press the valve tappet with special tools and hold on.



4.4.3.1 Pry out the adjustment gasket with screw driver, remove the gasket inside with magnet.



4.4.3.2 Adjust the thickness of adjustment gasket with



micrometer caliper.

4.4.3.3 Select the gasket on the basis of the standard value of valve tappet

① Intake valve
Select gasket thickness = Unload thickness + (Measured valve clearance -0.25mm)

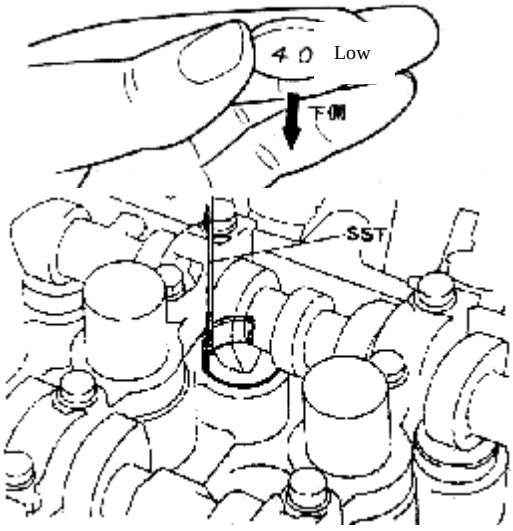
② Exhaust valve
Select gasket thickness = Unload thickness + (Measured valve clearance -0.25mm)

[Reference] The 32 kinds of gasket with different thickness are listed in the following table:

2.18	2.40	2.62
2.20	2.42	2.64
2.22	2.44	2.66
2.24	2.46	2.68
2.26	2.48	2.70
2.28	2.50	2.72
2.30	2.52	2.74
2.36	2.58	2.80
2.32	2.54	2.76
2.38	2.6	

4.4.3.4 Adjust the valve clearance with selected adjustment gasket.

Notice: Install the adjustment gasket with its identification mark facing downwards.

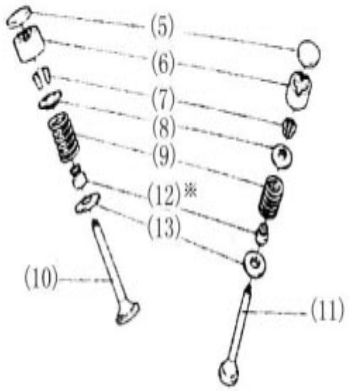


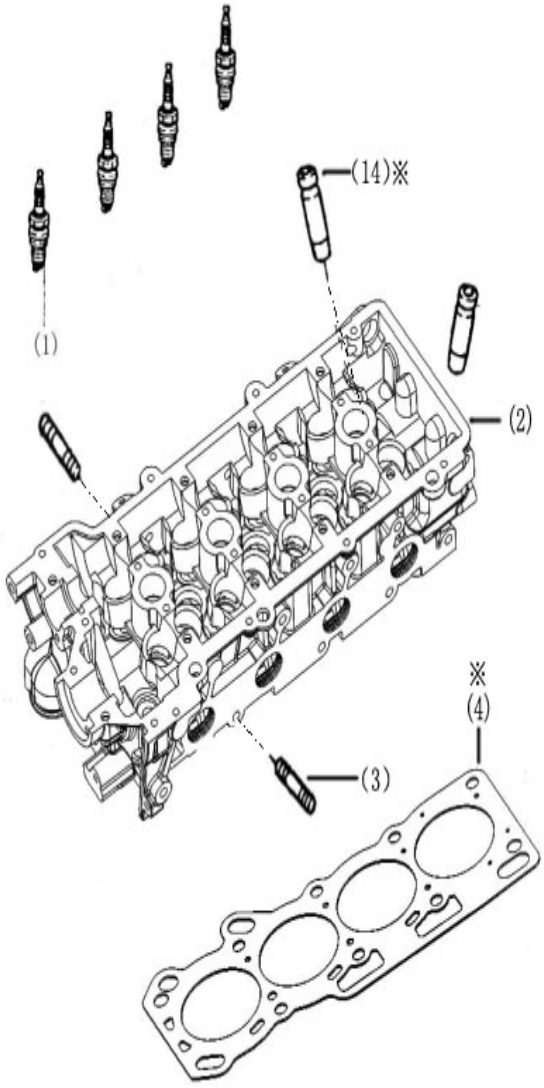
4.4.3.5 Rotate the crankshaft so that the crown head of the cam faces downwards and presses down the the valve. Pick up the special tool.

4.4.3.6 Rotate the crankshaft for 2-3 rounds and confirm once again the valve clearance. If it is still beyond the scope of standard value, adjust and inspect the valve clearance according to the operation specified in 4.1-4.4.

3) Cylinder Head

1. Structure Diagram





1 Spark plug 20±1Nm
2 Cylinder Head
3 Weather Strip I
4 Cylinder cushion
5 Adjustment gasket
6 Valve tappet
7 Valve spring retainer
8 Valve spring seat
9 Valve Spring
10 Intake valve
11 Exhaust valve
12 Valve oil seal
13 Valve seat
14 Valve guide

※: Components which may not be reused

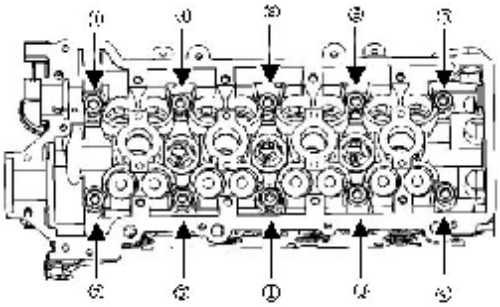
2. Disassembly

2.1 Disassembly of spark plug

2.2 There are 8 boltes on the cylinder head. In the course

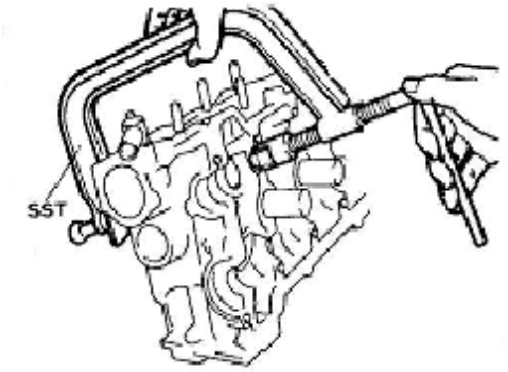
of the assembly of cylinder head, slowly tighten these bolts in the order as indicated in the right figure for several times untill ther are tightened properly.

Notice: Remove the cylinder head bolts with a torque socket wrench in the contrary order.



2.3 Disassembly of cylinder head and cylinder head gasket

Notice: The cylinder head gasket is nonreusable.



2.4 Disassembly of valve adjustment gasket and valve tappet

2.5 Disassemble the valve spring retainer lock, spring retainer, spring seat, valve spring, intake valve, and exhaust Valve etc with special tools.

2.6 Disassembly of valve oil seal and valve spring gasket

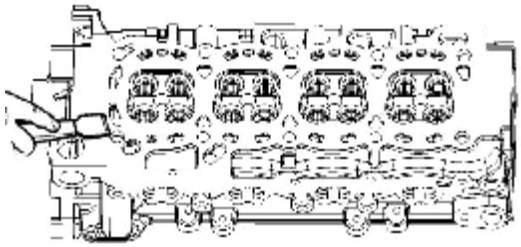
2.7 Cleanup

2.7.1 Clean the carbon dust on the valve.

2.7.2 Clean the bottom surface of cylinder head and the surface of intake and exhaust manifold with scraper knife.

Notice: The surface of the cylinder head may not be scratched in the course of cleanup.

Do not pollute the intake port and water passage.



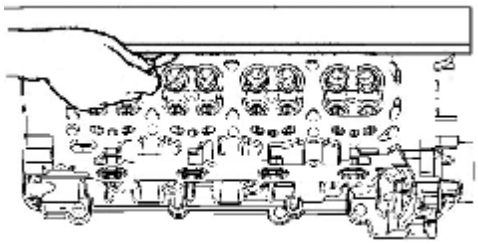
3. Routine Inspection

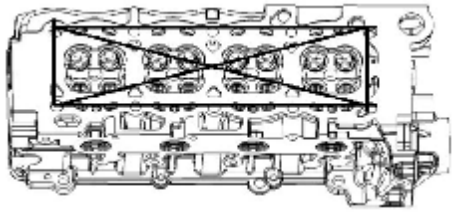
3.1 Cylinder Head

Measure the flatness at each point with ring gauge as indicated in the figure.

Cylinder head: 0.10mm

Surface of intake/exhaust manifold: 0.10 mm。

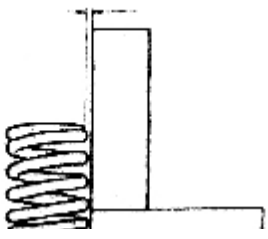




3.2 Valve Spring

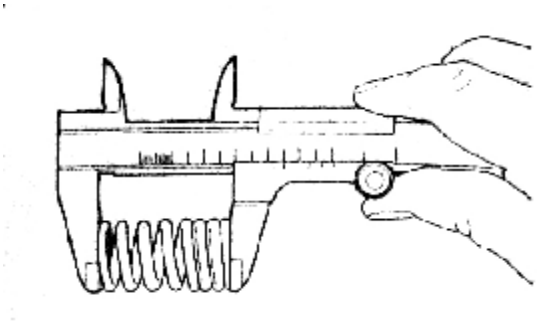
3.2.1 Measure the square degree of valve spring with square. Replace if it exceeds the specified value.

Limit: 1.2mm



3.2.2 Measure the free state of the spring.

Standard value: 37mm

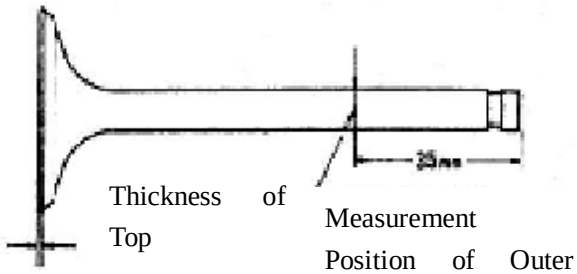


3.3 Inspection of valve

3.3.1 Check if it is deformed or abrades.

Inspection of valve Unit: mm

Item		Standard value	Limit: 0.10
Width of seal	IN	0.85～1.41	—
	EX	1.07～1.36	—
Thickness of top of valve	IN	1.0±0.2	0.75
	EX	1.0±0.2	0.75



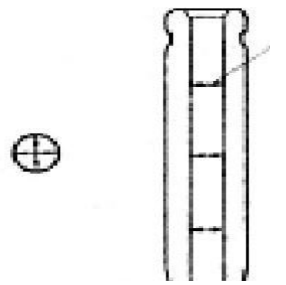
3.3.2 Check the clearance of valve guide and valve stem.

3.3.2.1 Measure the inside diameter of valve guide with dial gauge, the outer diameter of valve stem with micrometer caliper.

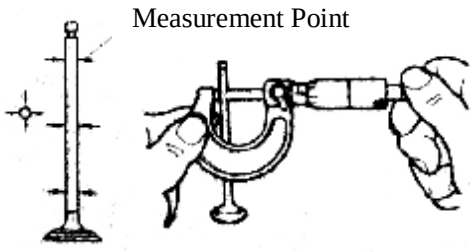
3.3.2.2 Figure out the difference of measured values and the clearance. If the clearance is beyond the specified value, replace valve or guide.

Notice: As can be seen from the right picture, at measuring point, work out the clearance of last abrasion part.

Item		Standard value	Limit: 0.10
Valve guide inside diameter(mm)		φ5.0	—
Valve guide outer diameter(mm)		φ5.0	—
Clearance	IN	0.056～0.020mm	0.07
	EX	0.066～0.030mm	0.08



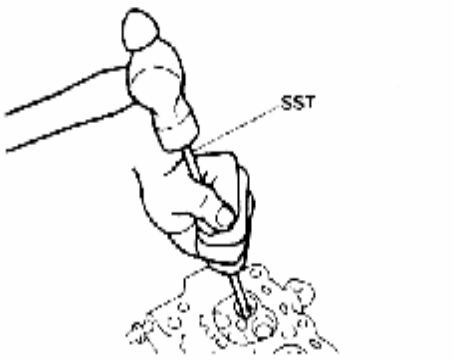
Measurement of Valve Guide Inside Diameter



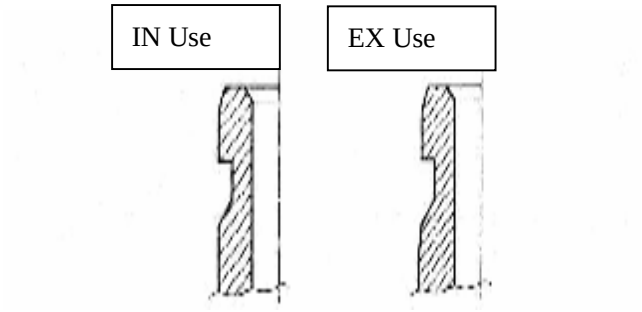
3.3.3 Replacement of valve guide.

3.3.3.1 Heat the cylinder head with hot water to 80-100 ℃.

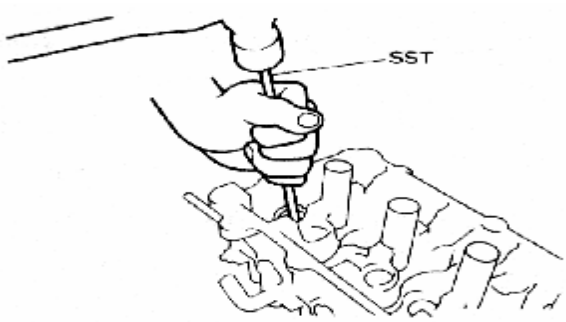
3.3.3.2 Take out the valve guide from one side of combustion chamber with special tool, as can be seen from the right picture.



Notice: The removed valve guide may not be reused. The intake valve guide and the exhaust valve guide may not be mis-installed.



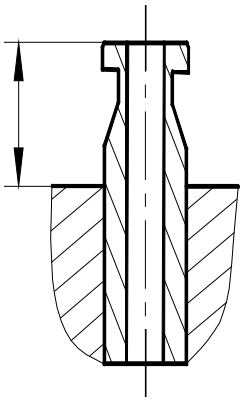
3.3.3.3 Mount the new valve guide with special tool at the place as can be seen from the right picture.



Notice: strike the conduit slowly to the position in the cylinder head; do not strike too far and be careful for size.

The height of the part of valve guide struck into the cylinder head:

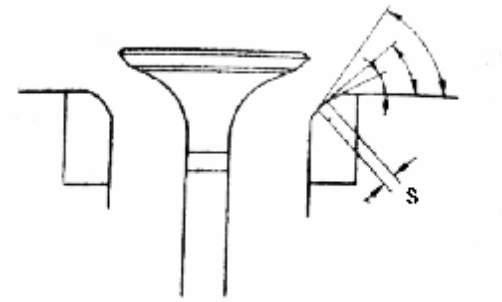
Item \ Type	EF	
	GL, ZL, RL, GS, ZS	
Height (mm）	IN	13.71±0.25
	EX	12.11±0.25



3.3.3.4 Rub the inside diameter with reamer to reach the standard clearance value.

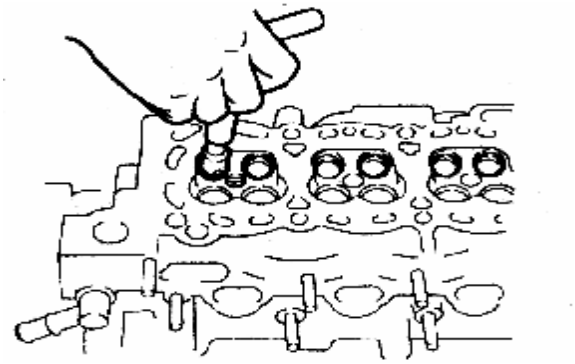
3.3.4 Assorted surface of valve

3.3.4.1 Spread with red lead on the assorted surface of valve. Do not rotate the valve but press lightly and check the assortment and width.



3.3.4.2 Repair of valve seat insert

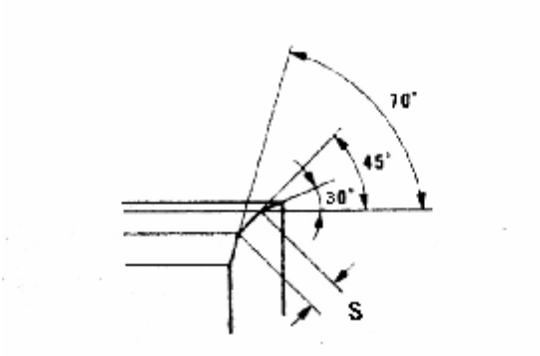
Notice: The repair of valve seat is always conducted in the course of the inspection of valve's fitting position. The surface repaired should be free from any breakage. Take it out slowly after the inspection.



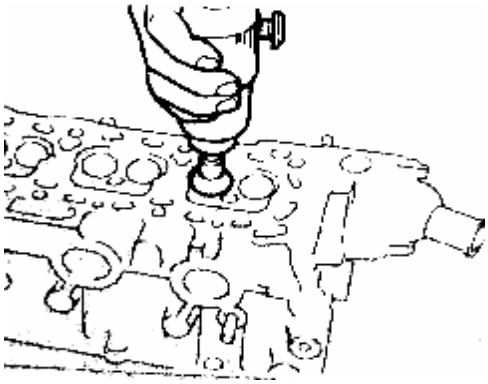
3.3.4.3 45wimble surface is assorted standard value.

3.3.4.4 Inspect the fitting position of the valve. The best position is the center of the valve. If no the valve should be adjusted.

3.3.4.5 Cut wimble surface at the center of assorted position with inner 70and outer 30



3.3.4.6 Prepare for polishing of valve seal.



3.4 Assembly of cylinder head

3.4.1 Cylinder head

Pay attention to the following for installing the other auxiliary part of cylinder head:

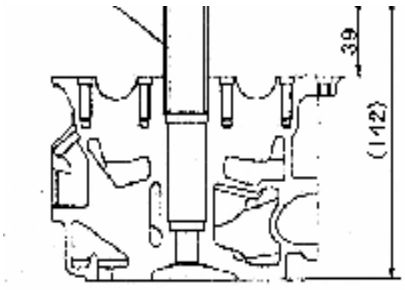
3.4.2 Protective tube of spark plug

1. Press the protective tube of spark plug into the protective tube hole on the cylinder head with the special auxiliary tool. Before pressing, spread the protective tube with sealant. The pressing depth is indicated in the right figure.

Notice: Pay attention to the pressing depth and the uprightness to top of cylinder head when pressing.

During pressing, the protective tube can not be deformed, or leaking will be occurred at the cylinder head cover.

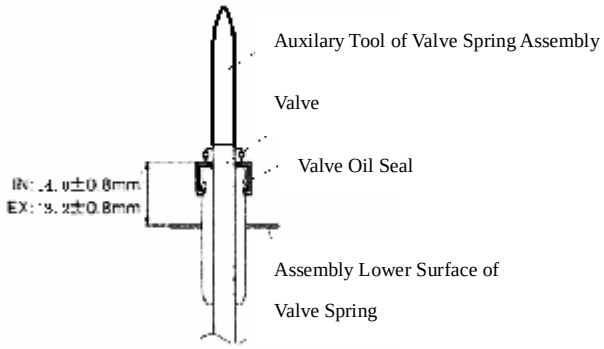
Protective Tube of Spark Plug



3.4.3 Installation

3.4.3.1 Assembly of valve spring washer and valve oil seal

3.4.3.1.1 Clamp the special auxiliary tool on the top of valve stem and spread oil around the auxiliary tool and the inner of new valve oil seal. Then mount it at the position as can be seen from the picture and pull out the mounting auxiliary tool of valve oil seal.

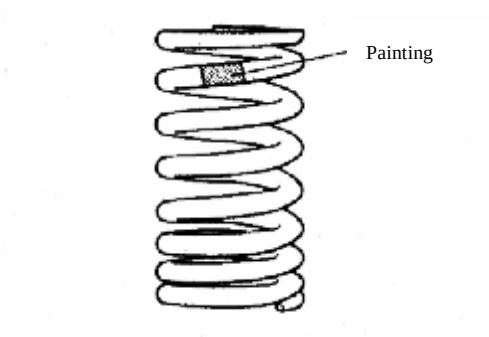


[Reference] After being pressed down, the size of the oil seal should comply with the value indicated in the right figure.

3.4.3.2 Assembly of intake valve and exhaust valve

3.4.3.2.1 Assembly of valve spring.

Notice: The painting is used for recognizing the different suppliers, so the same engine should use the valve spring with same painting.

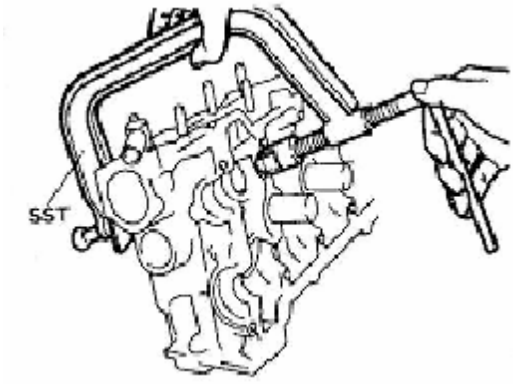


3.4.3.3 Assembly of valve keeper

Warning: Operate with goggle for protecting the eyes.

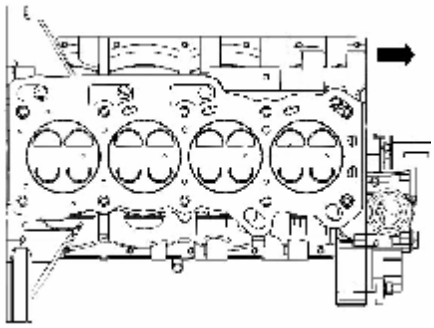
·Be care for spring jumping out.

After assembly of valve spring and its seat, press the valve spring with special tool and mount the valve keeper.



3.4.3.4 Assembly of valve tappet and valve clearance adjustment gasket

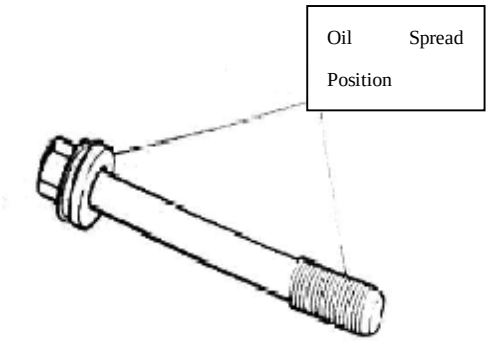
3.4.3.5 Mount the cylinder head gasket and recognize the direction of front and back.



3.4.4 Assembly of dust seal and cylinder head

assembly

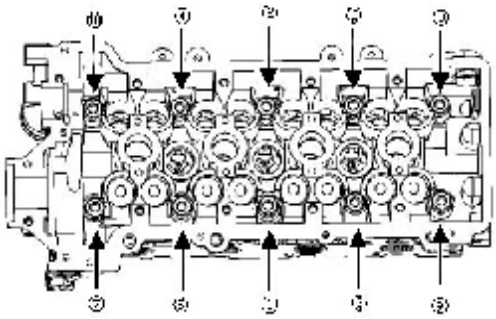
3.4.4.1 Spread a little oil on the flange side of bolt and threaded part



3.4.4.2 Tighten the cylinder bolts in the order indicated in the right figure for 3 times till the torque reaches the specified value. The tightening torque for each time is set forth as follows:

First time: 30±2Nm; second time: 50±3Nm; third time: 70±3.5Nm

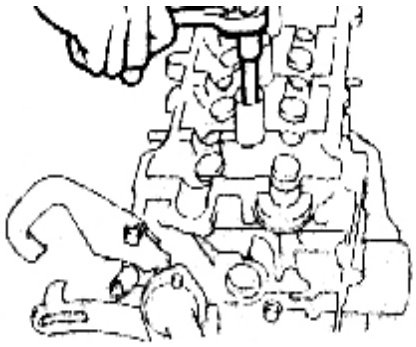
Torque: 70±3.5N.m



3.4.4.3 Mount spark plug

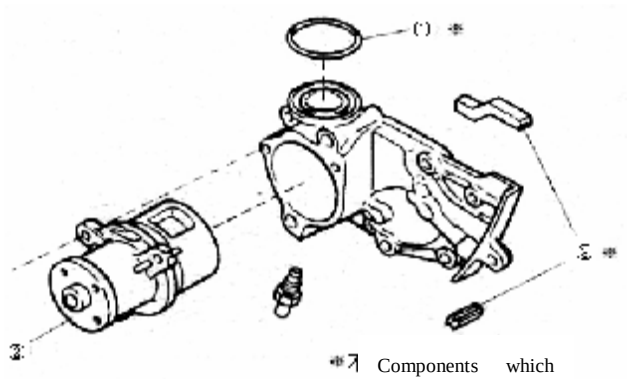
Torque: 20±1Nm

Notice: Tools should be vertical to prevent the protective tube of spark plug from distorting, or the oil will leak.



4) Water Pump

1. Structure Diagram



Components which may not be reused

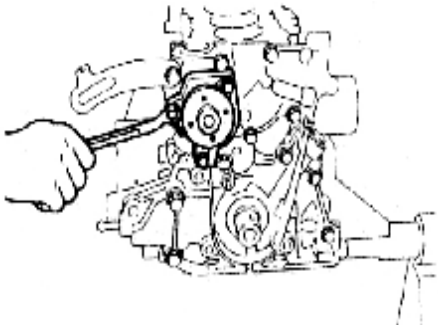
① O-ring (nonreusable)
② Water pump body
③ Dust seal

2. Disassembly

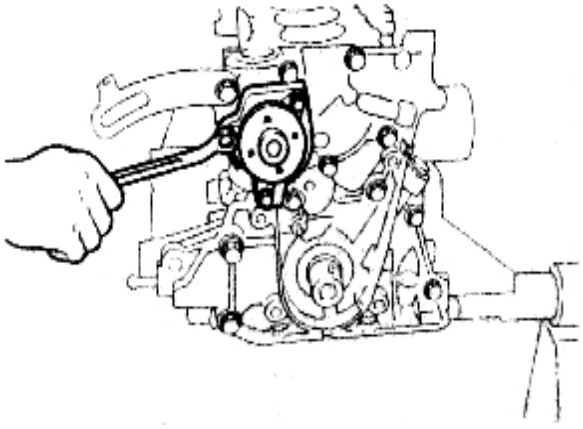
2.1.① Disassembly O-ring

Notice: The O-ring is nonreusable.

2.2 Screw off 3 bolts and disassemble water pump body.



2.3. Disassembly of dust seal



3. Cleanup

3.1 Clean water pump joint surface.

4. Routine Inspection

4.1 Check if it is deformed.

4.2 Rotate it with hand and inspect whether the rotor rotates and is lubricated well.

5 Assembly

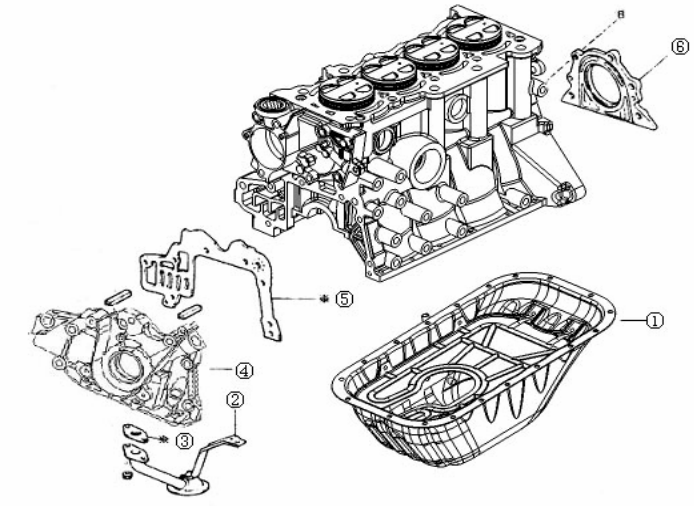
5.1 Mount Dust seal.

5.2 Mount Water Pump Body; torque: 25±1.5N.m.

5.3 Mount The New O-ring.

5) Oil Pump

1. Structure Diagram



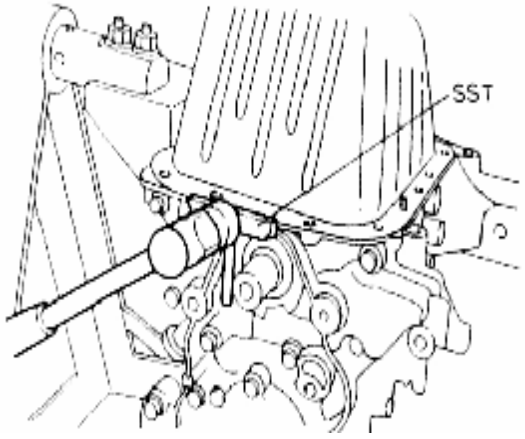
※: Components which may not be reused

① Torque for oil pan bolt: 8±2 N.m
② Oil collector
③ Oil collector spacer (nonreusable)
④ Oil pump
⑤ Oil pump spacer (nonreusable)
⑥ Rear oil seal bracket

2 Disassembly

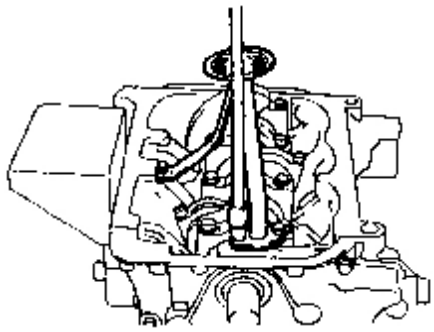
2.1 Screw off the bolts and nuts, and then remove the oil pan from the cylinder body with special tool (The engine is placed on the disassemble shelf upside down).

Notice: Don't make the oil pan flange deform.

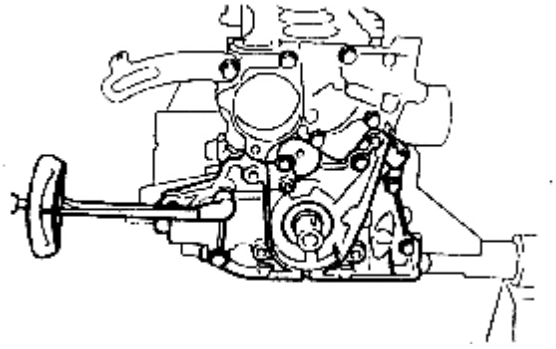


2.2 Remove the engine oil drainer, engine oil collector gasket

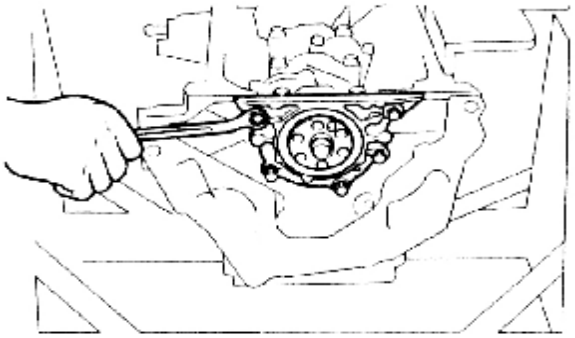
Notice: The oil collector gasket is nonreusable.



2.3 Remove the engine oil pump assembly and the engine oil pump gasket.



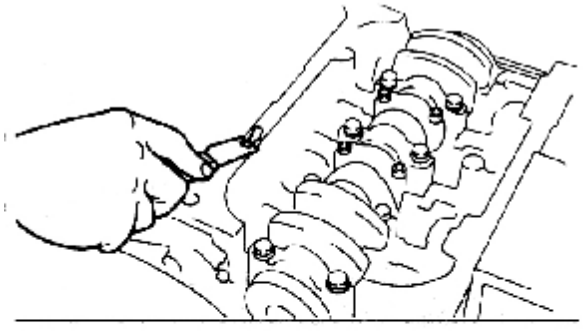
2.4 Remove the rear oil seal bracket.

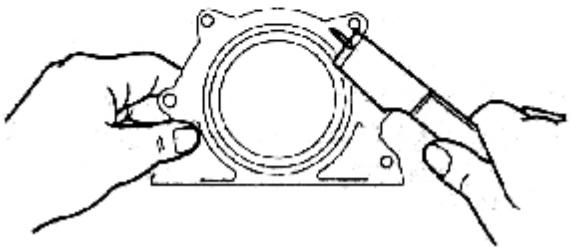


3. Cleanup

3.1 Remove the old cushion from the oil pan, oil pump and oil pan bracket with a scraper or shovel.

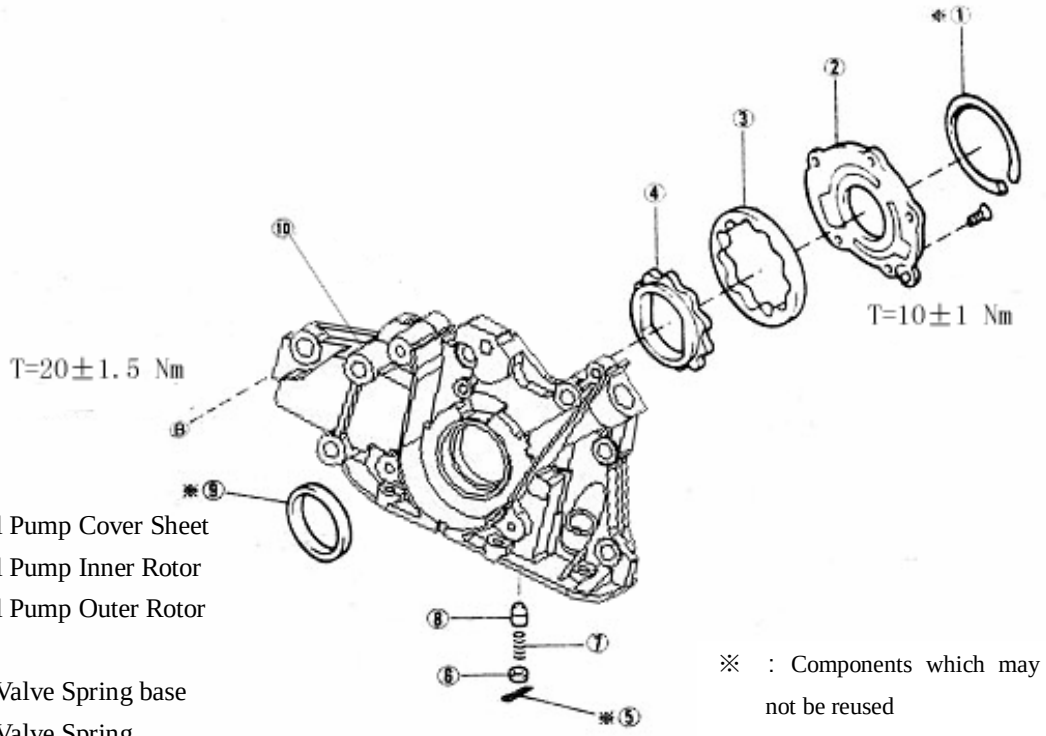
Notice: Don't let the fragment of the cushion fall into the cylinder.





4 Disassembly and Assembly of Engine Oil Pump

4.1 Structure Diagram



① Seal Ring
② Engine Oil Pump Cover Sheet
③ Engine Oil Pump Inner Rotor
④ Engine Oil Pump Outer Rotor
⑤ Cotter Pin
⑥ Oil Drain Valve Spring base
⑦ Oil Drain Valve Spring
⑧ Slide Block
⑨ Crankshaft Front Oil Seal
⑩ Engine Oil Pump Housing

※ : Components which may not be reused

Unit: N·m(kg·cm)

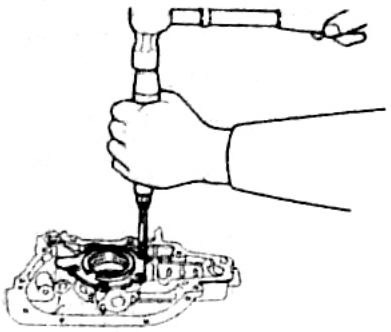
4.2 Disassembly

4.2.1 ① O-ring

Notice: The O-ring is nonreusable.

4.2.2 Remove the oil pump cover

Notice: If the screws are tightened, use a screw driver to remove them as indicated in the figure.

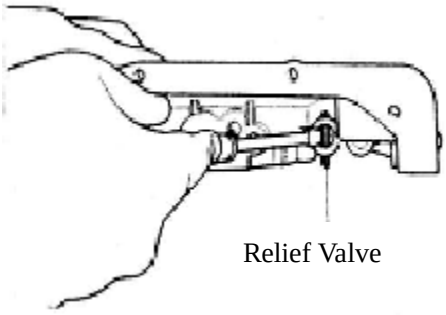


4.2.3 Remove the inner rotor, outer rotor of the engine oil pump.

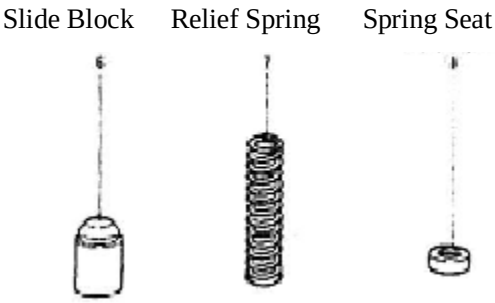
4.2.4 Remove the cotter pin

Notice: The cotter pin is nonreusable.

Notice: When removing the cotter pin, be careful not to let the spring or the spring seat spring out or fall off abruptly.

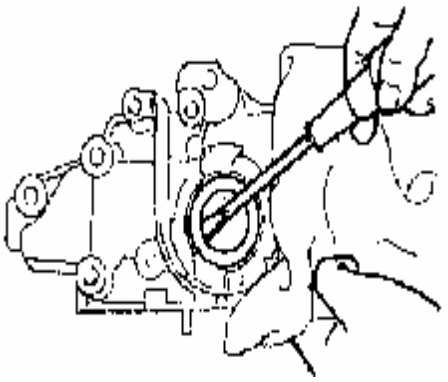


4.2.5 Remove the spring seat of the oil pressure relief valve for the engine oil pump, the coil spring, oil pump and oil pressure relief valve etc.



4.2.6 Remove the front crankshaft oil seal.

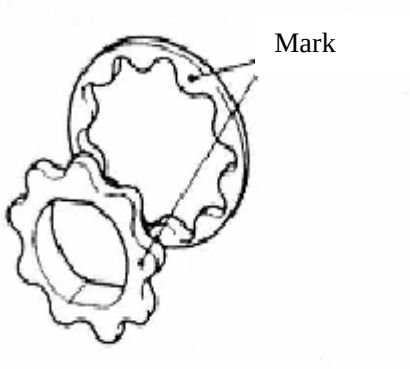
Notice: The oil seal removed may not be reused.



4.3 Routine Inspection

4.3.1 Inspect the engine oil pump for clearance.

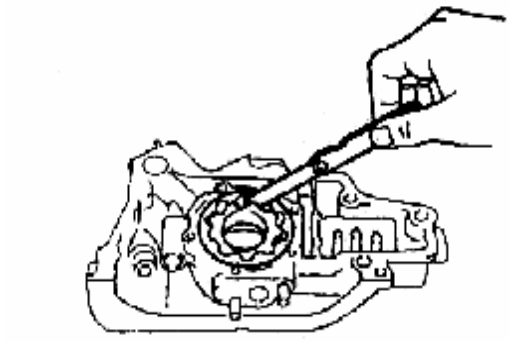
4.3.1.1 According to the marks for inner gear and outer gear in the engine oil pump, put the gears into the engine oil pump that is in the cylinder block.



4.3.1.2 Measure the clearance between the inner and outer gears with a feeler gauge

Standard value: 0.05-0.18mm (average value of 9 positions)

Limit: 0.35 mm



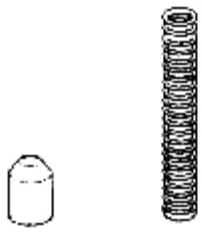
4.3.1.3 Measure the clearance between the rotor and pump body.

Standard value: 0.10-0.181mm

Limit: 0.25 mm

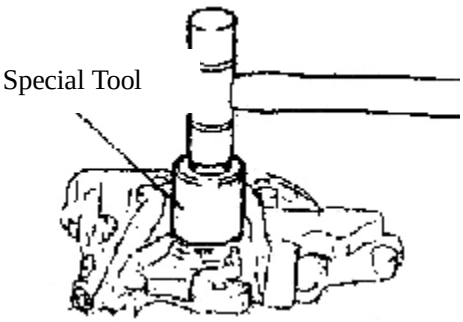
4.3.2 Inspect the oil pressure relief valve

4.3.2.1 No abrasion or scrape shall be found on the oil pressure relief valve.



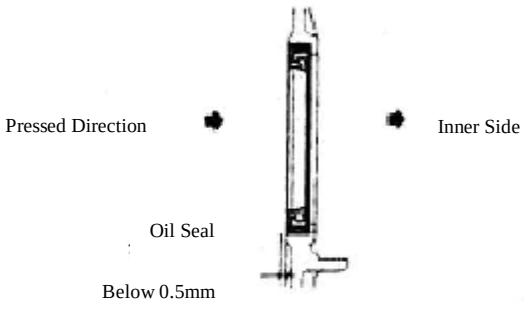
4.4 Installation

4.4.1 After the lip of the new oil seal for front crankshaft is spread with engine oil, fix it with a special tool.



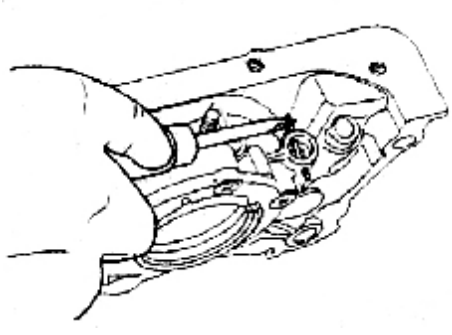
Notice: ·Use new oil seal

·The oil seal should be left less than 0.5 mm at its outer edge after it is pressed down.

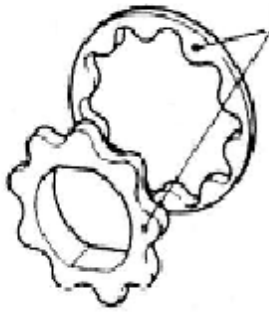


4.4.2 Assembly of the oil pressure relief valve for engine oil pump and the cotter pin.

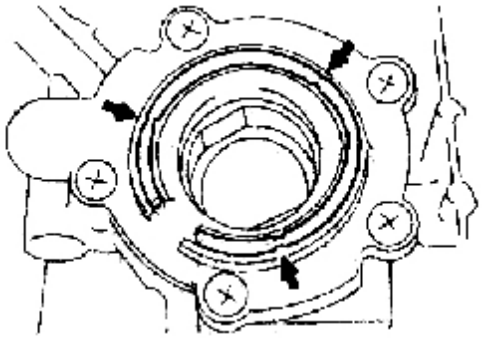
Notice: The cotter pin is nonreusable.



4.4.3 When the outer gear or inner gear is put into the engine oil pump, its mark should be seen.

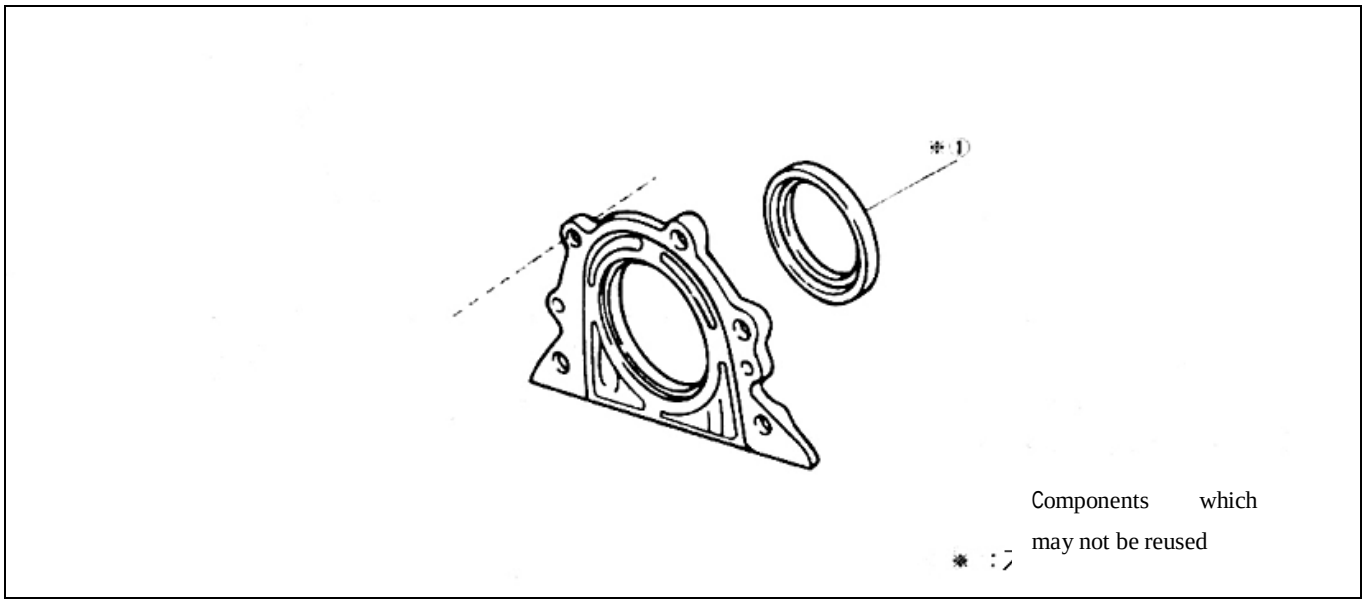


4.4.4 The new weather strip should be fixed in the groove of oil pump cover.



5. Disassembly of Oil Seal

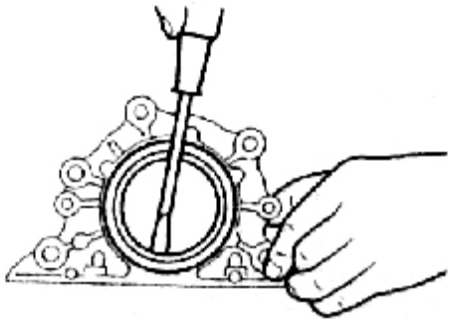
5.1 Structure Diagram



5.2 Disassembly

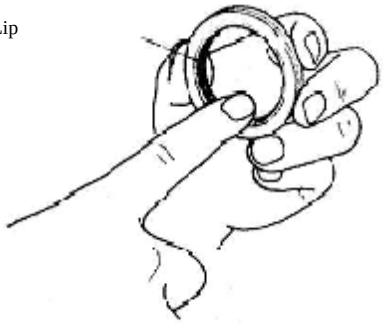
5.2.1 Remove the rear crankshaft oil seal with a screwdriver.

Notice: The rear oil seal of the crankshaft is nonreusable.



5.3 Inspection

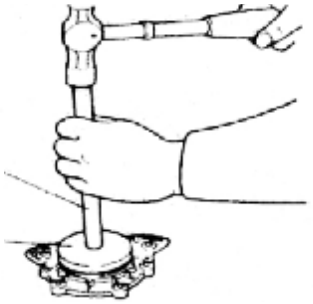
Inspect the oil seal for damage and the abrasion at its lip.



5.4 Assembly of oil seal

5.4.1 Spread engine oil over the lip of the new oil seal.

5.4.2 Mount the oil seal with special tool as indicated in the right figure

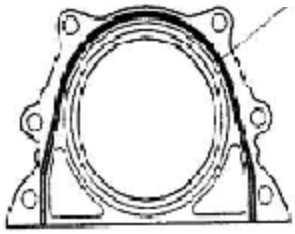


6. Assembly

6.1 Assembly of the oil seal seat

Spread sealant over the oil seal seat as shown in the right figure.

Grease: Loctite 5699

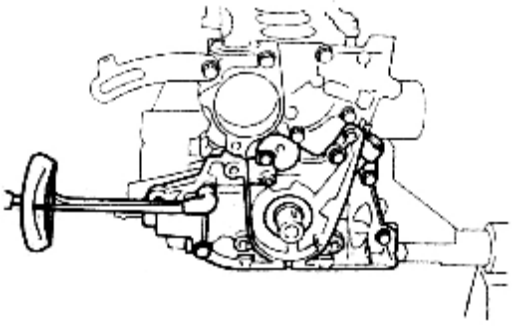


Notice: Spread the liquid sealant on the position of the oil seal base which is to contact with the cylinder body, and make sure the width of the sealant is 3-4mm.

Torque: 25±1.5N.m

6.2 Assembly of the new engine oil pump gasket and the engine oil pump assembly.

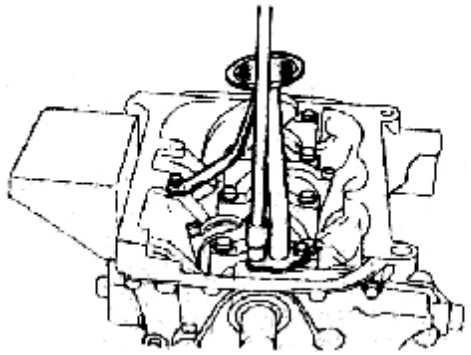
Torque: 20±1.5N.m



6.3 Assemble the new engine oil collector gasket and the

engine oil drainer

Torque: 6±1N.m



6.4 Assembly of the oil pan

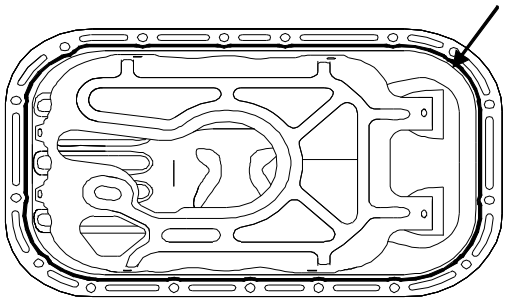
6.4.1 Clean up the joint surface between the oil pan with the cylinder.

6.4.2 Spread sealant, then assemble it.

Grease: Loctite 5699

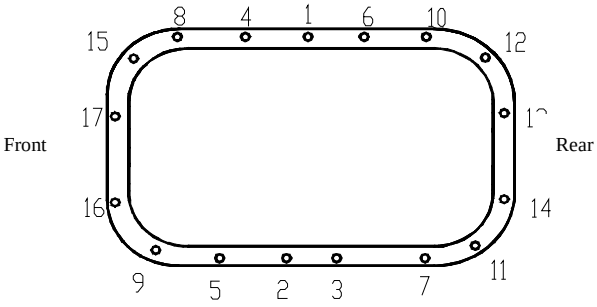
Notice: ·The sealing line should be unbroken with its diameter being ϕ3-4mm

·Assembly should take place fifteen minutes after glue-spreading.



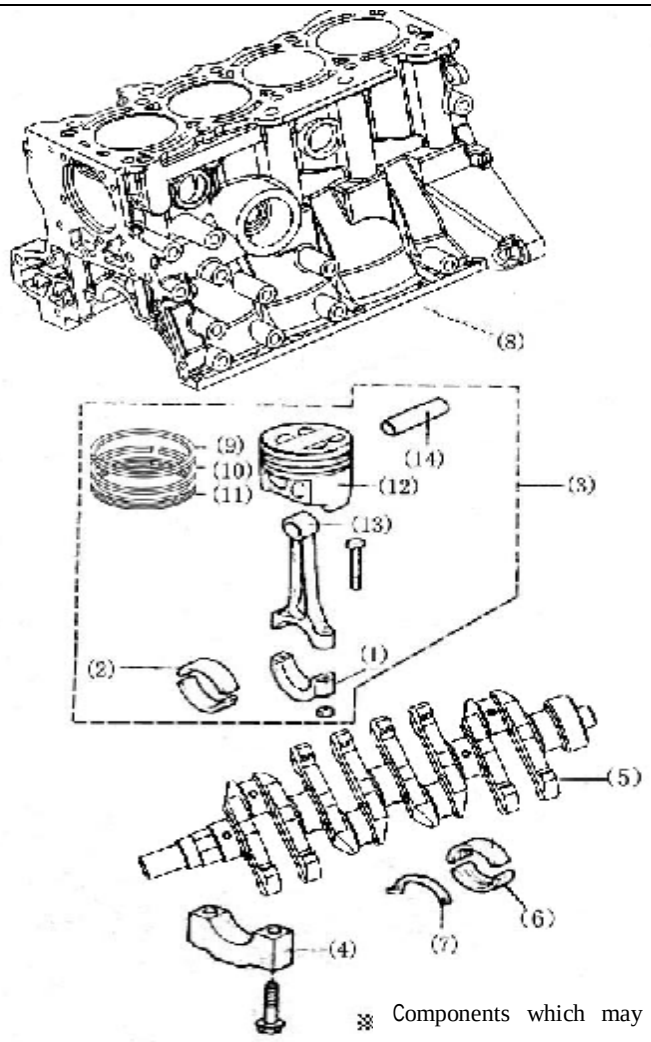
6.4.3 Tighten the bolts in the middle first up to the specified torque, then the bolts beside them as shown in the right figure.

Torque: 6±1N.m



6) Crank Connecting Rod Mechanism

1 Structure Diagram



※ Components which may not be reused

① Connecting rod cover
② Connecting rod bushing
③ Piston connecting rod assembly
④ Main bearing cap
⑤ Crankshaft
⑥ Crankshaft bearing bushing
⑦ Thrust plate
⑧ Cylinder body
⑨ First ring
⑩ Second ring
⑪ Steel tape combined oil ring
⑫ Piston
⑬ Connecting rod
⑭ Piston pin

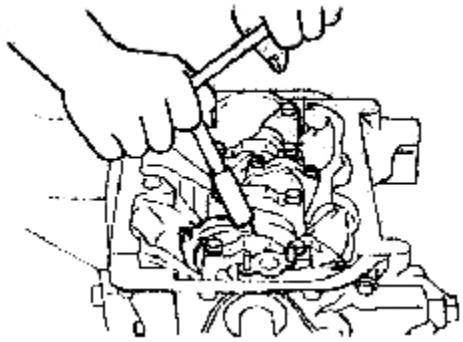
2 Disassemble of Crank Connecting Rod Mechanism

2.1 Inspect the axial momentum of the connecting rod

2.1.1 Measure the axial clearance with a dial gauge or feeler gauge.

Standard value: 0.15-0.25mm

Limit: 1.2mm

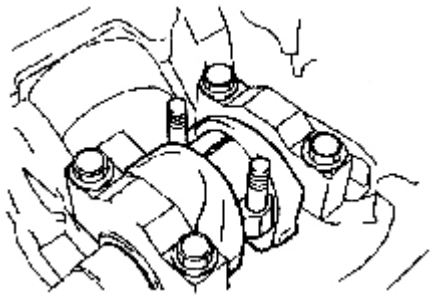


2.2 Inspect the connecting rod bushing for its radial clearance.

2.2.1 Remove the bushing cap.

Notice: The components of each cylinder shall be placed in order.

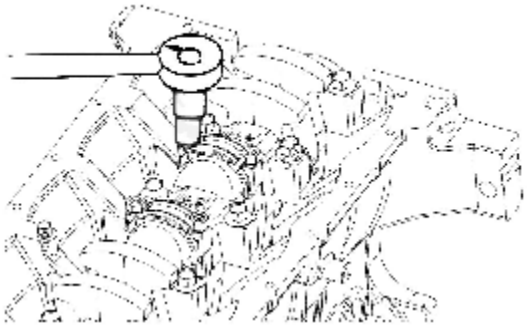
2.2.2 Clean the bearing bushing and the axle.



2.2.3 Conduct radial adjustment for the axial diameter of connecting rod with clearance gauge.

Tighten the bushing cap with specified torque.

Torque: 40±2N.m

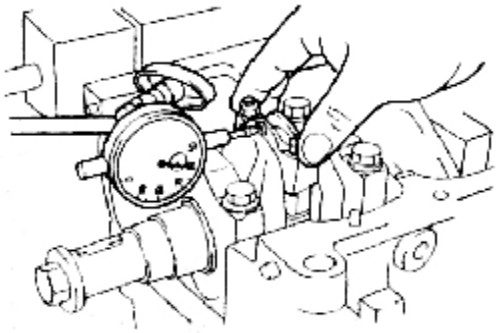


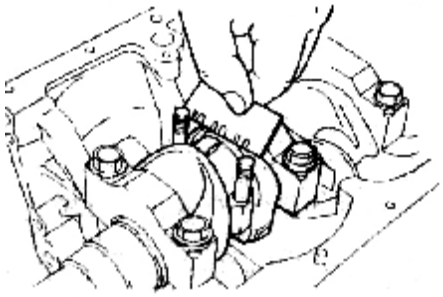
Notice: The crankshaft may not rotate.

2.2.4 Remove the bushing cap, measure the maximum thickness of the searcher.

Standard value: 0.020-0.044 mm

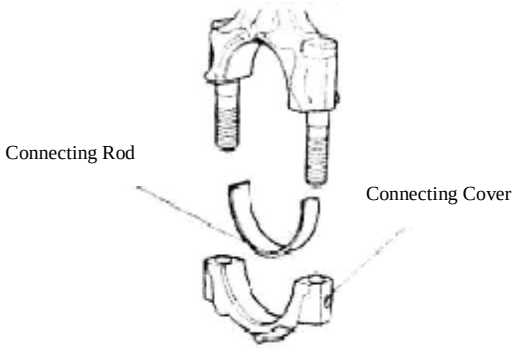
Limit: 0.07 mm



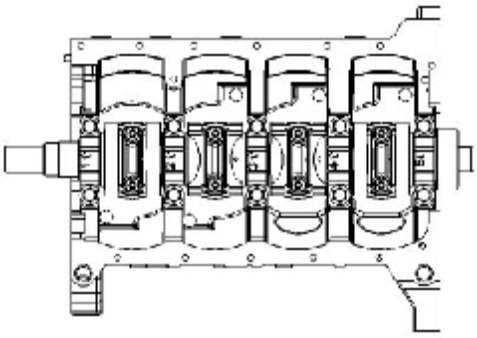


2.2.5 If it is beyond the limit, replace the bearing bushing.

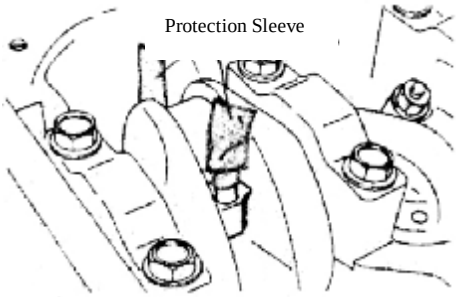
Notice: Replacing the bearing bushing with the product of the same manufacturer's brand. The thickness of the connecting rod bushing which meets the requirements of clearance = diameter of big end hold – axial diameter of connecting rod – standard value of bearing bushing clearance



2.2.6 Remove the connecting rod bearing cap and the connecting rod bearing bushing



2.2.7 Put vinyl-resin protecting jacket on the threaded part of the connecting rod bolt so as to prevent the bolts from scraping the cylinder hole and the crannkshaft connecting rod journal, and then disassemble the piston connecting rod by using the hammer handle striking it out.



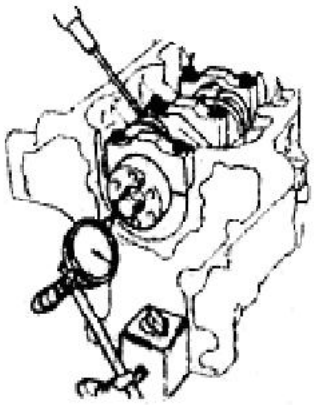
2.3 Inspect the axial clearance of crankshaft

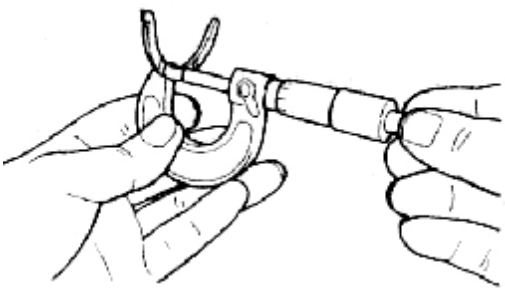
2.3.1 Measure the axial clearance of the crankshaft with a dial gauge, if it is beyond the limit, it is necessary to replace the axial thrust plate or the crankshaft.

Standard value: 0.089-0.211mm

Limit: 0.30mm

Item	Standard value
	$1.9^{-0.11}_{-0.03}$

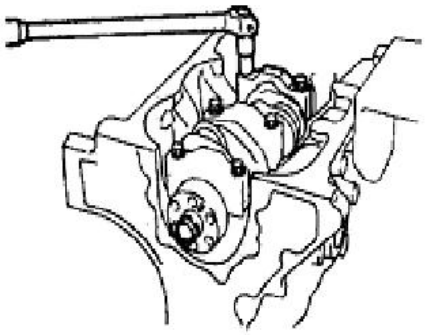


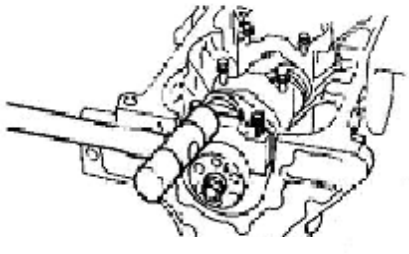


2.4 Inspect the crankshaft for its radial clearance.

2.4.1 Remove the crankshaft bearing cap by softly tapping with a resin hammer.

2.4.2 Clean the inside and surface of the bearing bushing, the inside and surface of the bearing cap, the cylinder wall and journal. Inspect them for abrasion and damage carefully.





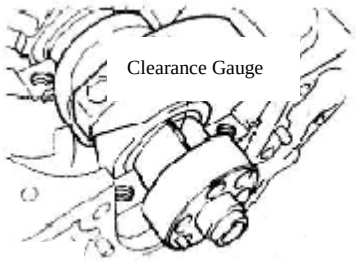
Protection Sleeve

2.4.3 Adjust the radial clearance of the crankshaft with a clearance gauge, and tighten the bearing bushing cover bolts with the specified torque.

Torque: 70±3.5N.m

Notice: After tightening the bolts, the rotating torque of the crankshaft should be less than 1Nm

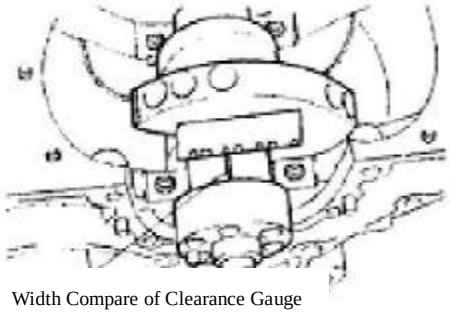
（The torque of crankshaft without piston connecting rod）



2.4.4 Remove the bearing cap and measure the maximum width with a clearance gauge. If the measurement result exceeds the limit, replace the bearing bushing.

Standard value: 0.025-0.069mm

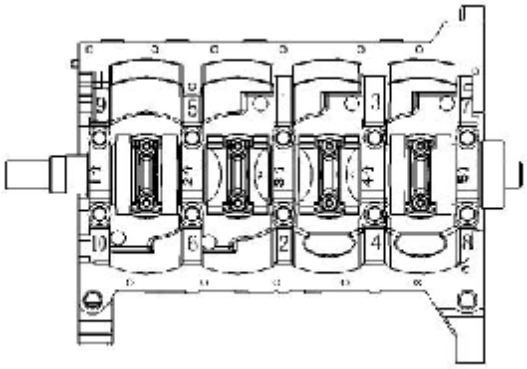
Limit: 0.10mm



Width Compare of Clearance Gauge

2.4.5 Remove the main bearing bushing cap of the crankshaft, crankshaft, crankshaft bearing bushing and crankshaft axial thrust plate

Notice: Tighten the bolts for the crankshaft bearing cap in the order shown in the right figure. Tighten the bolts for three times, then the torque must be up to the specified value.



2.5 Disassembly and assembly of the piston and connecting rod assembly

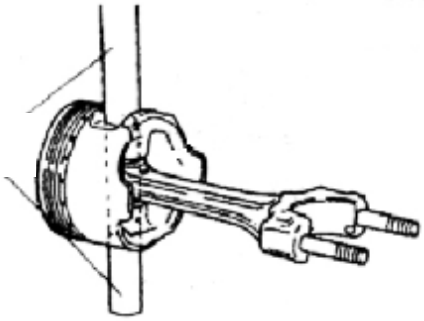
2.5.1 Remove the first ring, second ring and the oil ring with a pair of piston ring moving pliers.

Notice: Don't get the piston and piston ring of each cylinder confused.

2.5.2 Remove the piston, connecting rod and the piston pin with special tool.

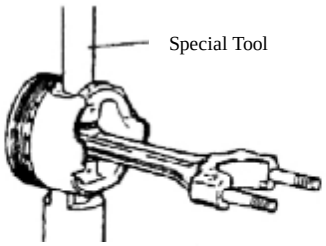
Disassemble the piston pin with special tool as indicated in the right figure.

Special Tool



① As indicated in the right figure, disassemble the piston which is at the state mentioned above with special tools. Remove the piston pin with special tool, and then remove the piston and the connecting rod.

Special Tool

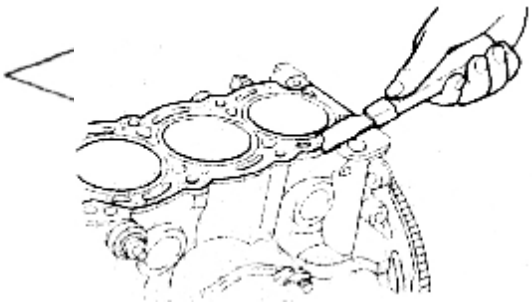


3 Cleanup

3.1 Cylinder Body

Warning: In the course of cleanup, protect your eyes with eyeglass.

3.1.1 Clean up the cylinder body, cylinder head, oil pan, oil pump and the oil seal with a flat blade.



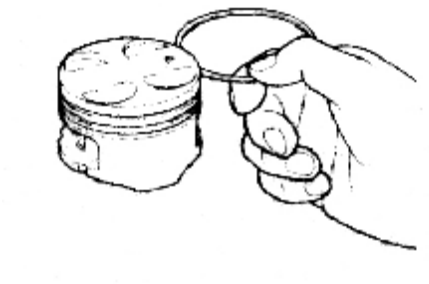
3.2 Piston

Warning: In the course of cleanup, protect your eyes with eyeglass.

3.2.1 Use an old ring to remove the carbon in ring groove.

3.2.2 Remove the carbon of parts with scavenger.

Notice: Don't use hard articles such as metal brush.



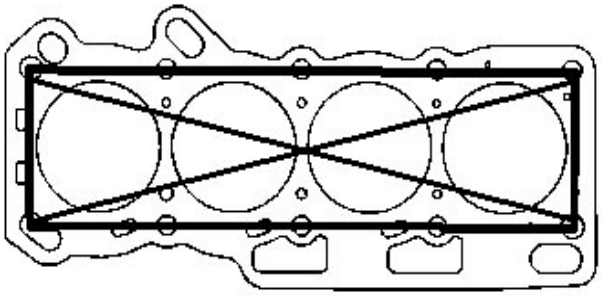
4 Routine Inspection

4.1 Cylinder Body

4.1.1 Inspect the top surface of cylinder body for its flatness

(1) Measure at the six points shown in the right figure with a ruler and a feeler gauge.

Limit: 0.08mm



4.1.2 Use of bore gauge

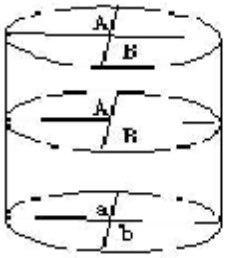
Measure the cylinder bore at the positions as indicated in the right figure with a bore gauge, and figure out the difference between the maximum value and the miximum value. If the difference exceeds the limit, repair or replace the cylinder.

Limit: 0.03mm

[Reference] Roundness: A-B or a-b

Cylindric degree: A-a or

[Reference] Standard diameter of cylinder: φ72.00-72.01mm



Upper Stopper Position of Piston

Lower Stopper Position of Piston

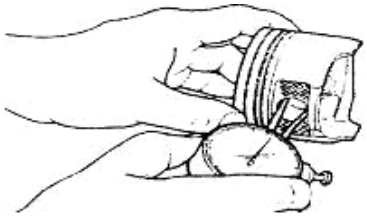
4.2 Piston

4.2.1 Inspect the piston pin hole for its clearance

Measure the piston pin at several positions with a micrometer caliper shown in the figure, make the maximum value as the diameter of pin.

Measurement Position of Piston Pin

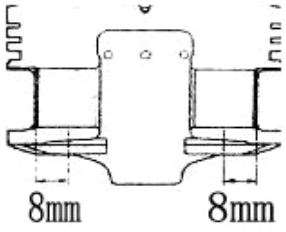
4.2.2 Measure the diameter of piston pin at several positions with an inner-diameter dial gauge as shown in the figure, make the minimum value as the diameter of the pin hole.



Work out the clearance with the difference between the pin diameter and pin hole diameter, if the difference is beyond the standard value, replace the piston pin or piston.

Standard value: 0.004-0.009mm

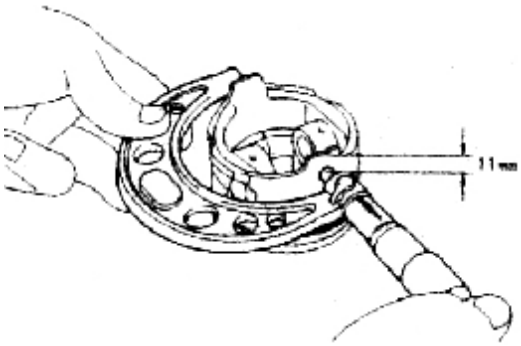
Limit: 0.015mm



4.2.4 Measure the diameter of the piston

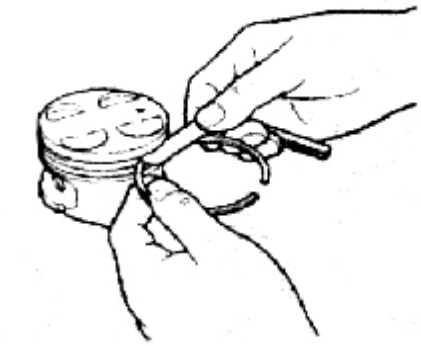
4.2.4.1 Measure at about 11 mm to the bottom of the piston, along the direction vertical to the piston pin.

Standard value: $f72^{-0.013}_{-0.025}$



4.2.5 Inspect the clearance between the piston ring and the ring gloove

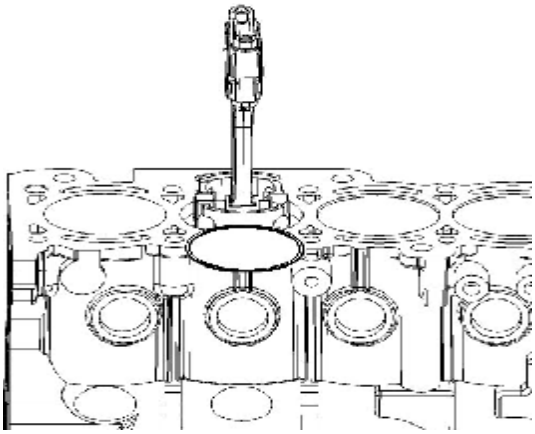
4.2.5.1 Measure around the ring gloove with a piston ring and a feeler gauge



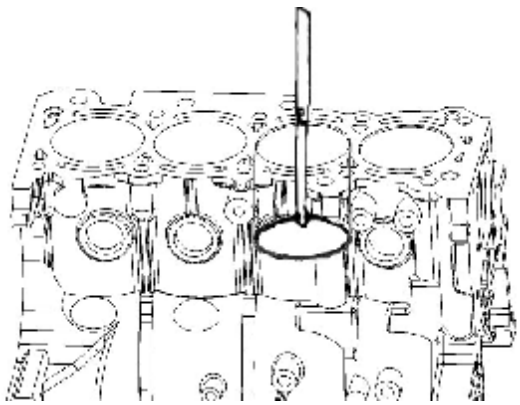
	Standard value (mm)	Limit (mm)
First ring	0.03~0.06	0.12
Second ring	0.03~0.06	0.11

4.2.6 Inspect the end clearance of piston ring

4.2.6.1 Put the piston ring 45mm below the top surface of the cylinder hole. Press down the piston ring with the piston head, and then measure the opening with a feeler gauge.



	Standard value (mm)	Limit (mm)
First ring	0.25-0.40	0.65
Second ring	0.35~0.50	0.65
Oil ring	0.20~0.70	1.00



4.2.7 Inspect the clearance between the piston and cylinder wall

4.2.7.1 Measure the inner diameter of the cylinder and the outer diameter of the piston at the positions as indicated in the right figure. If the measurement results exceed the limit, replace the piston or cylinder.

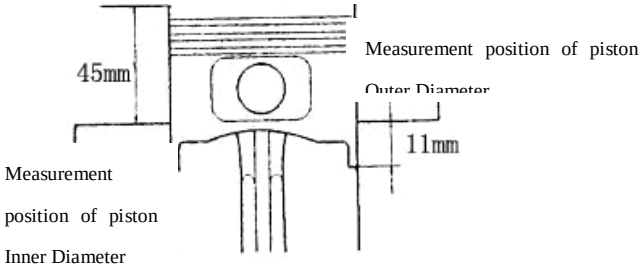
Standard value: 0.018～0.030

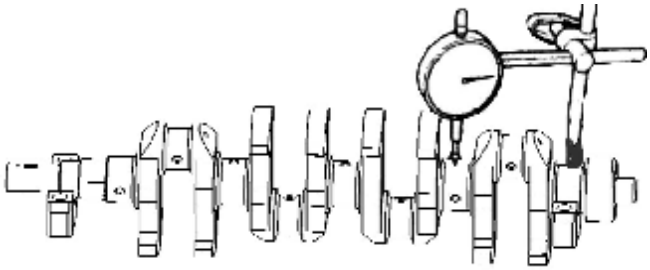
Limit: 0.10

[Reference] The clearance between the piston and cylinder bore is controlled by the difference between the minimum inside diameter of piston hole and the maximum outer diameter of piston.

4.2.7.2 After replacing the piston or the cylinder body, confirm the clearance again

Standard value: 0.018～0.030





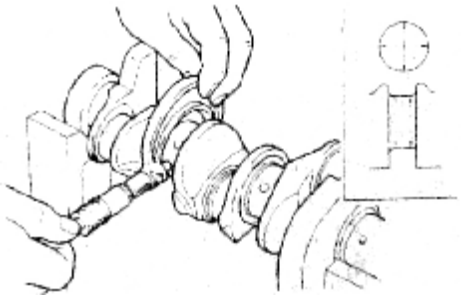
4.3 Crankshaft

4.3.1 Inspect the proper alignment of the main axle diameter.

4.3.1.1 Measure the proper alignment with a dial gauge, if the proper alignment is beyond the limit, replace the crankshaft.

Limit: 0.03mm

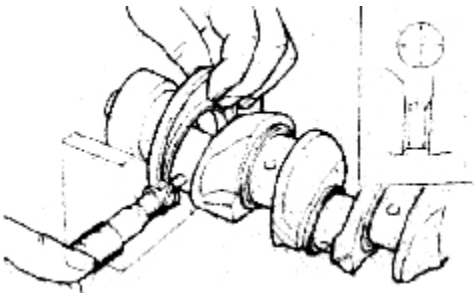
Notice: The bending value should be equal to one-second the run-out value of crankshaft rotating one circle.



4.3.2 Inspect the crankshaft for the abrasion.

4.3.2.1 Measure the connecting rod journal at the positions indicated in the left figure with a microcaliper, and figure out the roundness and cylindricity.

Limit: 0.005mm



4.3.2.2 Measure the connecting rod journal at the positions indicated in the right figure with a microcaliper, and figure out the roundness and cylindricity.

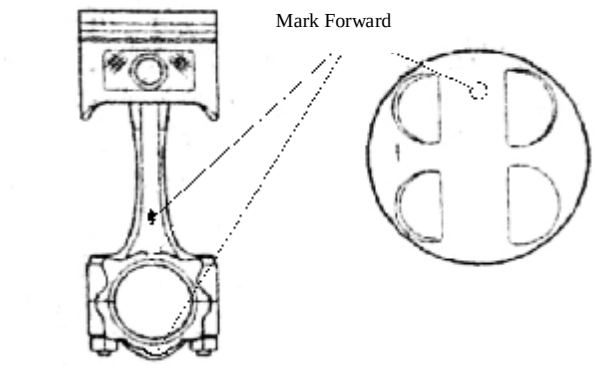
Limit: 0.004mm

5 Assembly of Crank Connecting Rod mechanism

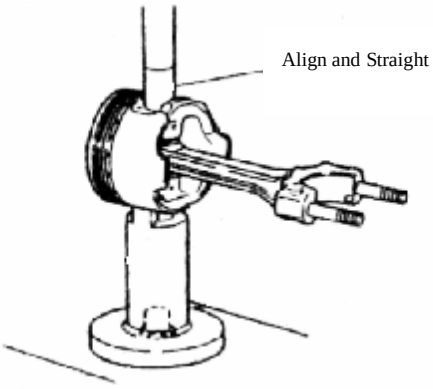
5.1 Assembly of the piston connecting rod

5.1.1 Assemble the piston, connecting rod and the piston pin with special tool following the instructions below:

5.1.1.1 Spread engine oil over the pin hole of the connecting rod, assemble according to the group mark and direction mark of piston and connecting rod.



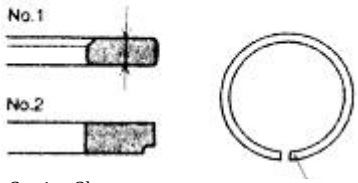
5.1.1.2 Assemble the piston and the connecting rod with special tools shown in the right figure.



5.1.1.3 Adjust and assemble the piston and connecting rod as indicated in the right figure. Spread the piston pin with oil and then assemble the piston and connecting rod with a oressing machine.

Notice: When pressing in the piston pin, make sure the fitting direction is correct.

·When the piston pin is pressed into the piston, the small end of the connecting rod should be heated to 300℃, and the pin should be aligned properly.



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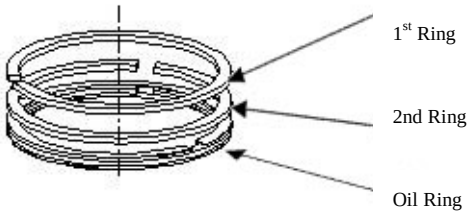
5.2 Install the first and second pistion ring and the oil ring according to the following instruction:

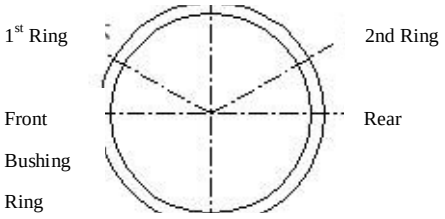
5.2.1 Installation of piston ring

Make the side with marks face upwards, and then fix it with piston pin tools.



Lower Blade

5.2.2 Mount the steel tape combined oil ring (bushing ring lower, lower blade, upper blade) firstly, and then mount the second gas ring, and finally mount the first gas ring. Opening angles of rings are shown in the figure:

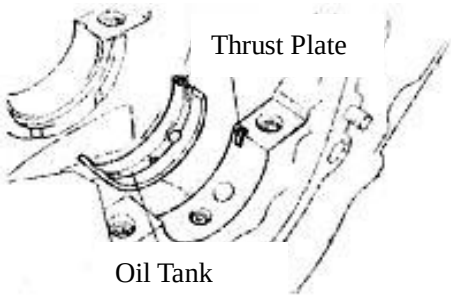


Upper Blade

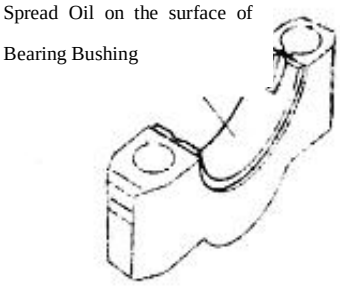
5.3 Resemble the crankshaft main bearing cap, crankshaft, crankshaft bearing bushing and the crankshaft axial thrust plate, pay attention to the following:

5.3.1 Assembling the bearing bushing, its raised thrust block should fit into the locating groove in the cylinder body.

Notice: The bearing bushing is from the same manufacturer.



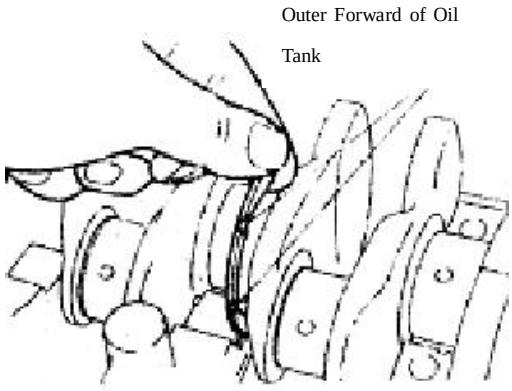
5.3.2 Spread the crankshaft bearing bushing (upper piece) with oil before assemble the crankshaft



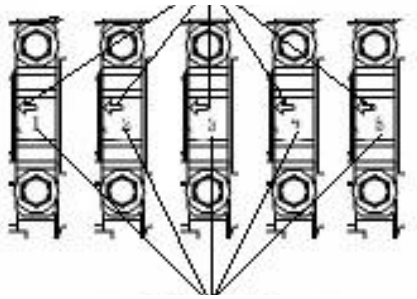
5.3.3 Mount the thrust plate on the cylinder body bearing base and make sure that the side with oil gloove (crankshaft shank) face outwards.

Notice: Spread the side of oil glove with oil

5.3.4 Fix the crankshaft bearing bushing (lower piece) in the bearing cap, the bearing bushing should fit into the thrust groove.

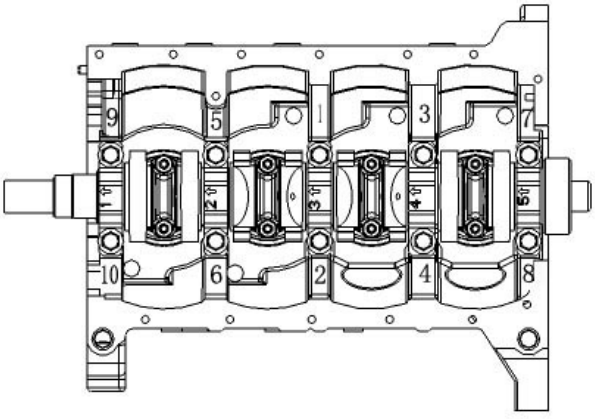


5.3.5 Spread engine oil over the friction surface of crankshaft bearing bushing (lower piece), assemble the bushing according to the mark forwards in the main bearing cap of the crankshaft.



5.3.6 Spread oil over the bolts, within three or two times, tighten them with specified torque.

Torque: 70±3.5N.m



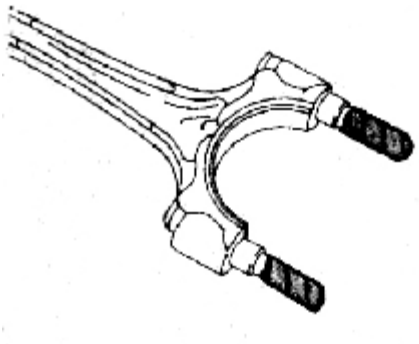
5.3.7 Rotate the crankshaft after assembly, it should rotates swiftly, the rotating torque should be less than 1Nm.

5.4 Assemble the piston and connecting rod assembly, connecting rod bearing bushing and the connecting rod bearing cap, pay attention to the following:

5.4.1 The opening of compression ring and the opening of oil ring should be in the specified direction.

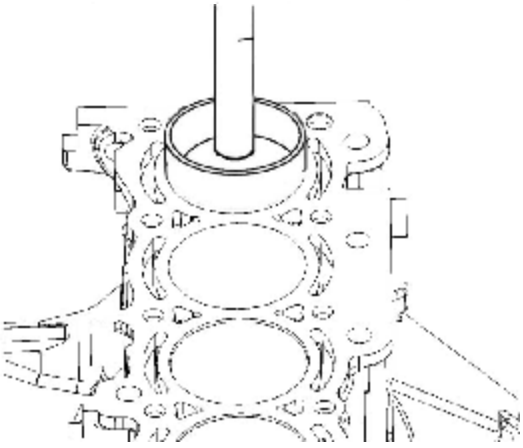
5.4.2 The bolts of the connecting rod should be covered with nylon sleeves for fear of scraping the cylinder body and the axle.

5.4.3 The surfaces of piston and connecting rod and other surfaces where relative motion exists should be spread with engine oil.



5.4.4 Confirm the mark forwards of the piston and strike it into the cylinder body with the piston ring striking tool.

Notice: The cylinder number of the piston and connecting rod assembly should be in accordance with the cylinder number.

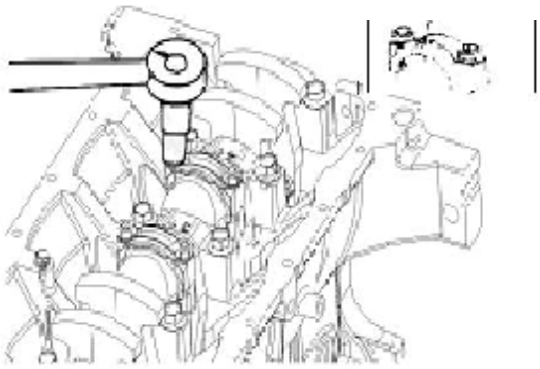


5.4.5 Assemble the connecting rod bearing cap and the connecting rod bushing, pay attention to the following:

5.4.5.1 Put the cover on the bolt as per the mark forwards, spread a little engine oil over the joint surface between the nut and its seat.

5.4.5.2 Tighten the right nut and the left nut alternatively for several times with specified torque.

Forward Mark



Torque: 40±2N.m

Notice: The connecting rod and the connecting rod bushing should be of the same subassembly:

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Chapter 3. Table of Main Fit Clearance for SQR472 Engine SQR472

1 Clearance between Cylinder Hole and Piston Skirt (Piston to Cylinder Clearance)

	Name of Component	Size and Tolerance	Clearance or Value of Interferenc	Remark
	Cylinder hole	$\varphi 72^{+0.01}_{0}$	Divided into two groups: Clearance for group X: 0.019mm～0.03mm Clearance of group S: 0.018mm～0.029mm	Group X: $F72_{0}^{0.005}$ Group S: $F72_{0.005}^{0.01}$
	Piston skirt	$\varphi 72^{-0.015}_{-0.025}$		

2 Clearance of Crankshaft Main Bearing

	Name of Component	Size and Tolerance	Clearance or Value of Interferenc	Remark
	Crankshaft main journal	$\varphi 42h_{6-0.016}$	Clearance 0.025~0.069	
	Bearing bushing	$2^{0}_{-0.006}$		
	Bore of cylinder main bearing	$\varphi 46F_6{}^{+0.041}_{+0.025}$		

3 Clearance of Crankshaft Connecting Rod Bearing

	Name of Component	Size and Tolerance	Clearance or Value of Interferenc	Remark
	Crankshaft connecting rod journal	$\varphi 37h_6{}^{0}_{-0.016}$	Clearance 0.025~0.069	
	Bearing bushing	$1.5^{0}_{-0.006}$		
	Bore of connecting rodbig end bearing	$\varphi 40F_6{}^{+0.041}_{+0.025}$		

4 Clearance between Piston Pin and Piston Pin Hole

	Name of Component	Size and Tolerance	Clearance or Value of Interferenc	Remark
	Piston Pin Hole	$\varphi 18^{+0.007}_{+0.002}$	Divided into twogroups Clearance for group A: 0.004 mm～0.0085mm; Clearance for group B: 0.0045mm～0.009 mm	Notice: When installed with hand, the piston pin may pass through the piston pin hole smoothly without any obvious obstruction, otherwise the piston pin should be replaced.
	Piston pin	$\varphi 18^{-0.001}_{-0.004}$		

5 Inteference between Piston and Small End of Connecting Rod

	Name of Component	Size and Tolerance	Clearance or Value of Interferenc	Remark
	Connecting rod small end hole	$\varphi 18^{-0.026}_{-0.044}$	Value of Interferenc 0.021~0.043	

	Piston Pin	$\varphi 18\ ^{-0.001}_{-0.005}$		

6 Fit Clearance between Connecting Rod Body Hole and Bolt Bar

Name of Component		Size and Tolerance	Clearance or Value of Interferenc	Remark
	Connecting rod body hole	$\varphi 8.08\ H_7\ ^{+0.015}_{0}$	Value of Interferenc 0.008~0.032	The hole should be processed along with the connecting rod body.
	Bolt Bar	$\varphi 8.08\ S_6\ ^{+0.032}_{+0.023}$		

7 Fit Clearance between Connecting Rod Cover Hole and Bolt Bar

Name of Component		Size and Tolerance	Clearance or Value of Interferenc	Remark
	Connecting rod cover hole	$\varphi 8.08\ H_7\ ^{+0.015}_{0}$	Clearance 0.005~0.029	The hole should be processed along with the connecting rod body.
	Bolt bar	$\varphi 8.08\ f_6\ ^{-0.005}_{-0.014}$		

8 Radial Clearance of Camshaft Bearing

Name of Component		Size and Tolerance	Clearance or Value of Interferenc	Remark
Intake	Cylinder Head	$\varphi 26H_7\ ^{0.021}_{0}$	Clearance 0.020~0.054	1st bearing cap
	Camshaft	$\varphi 26f_6\ ^{-0.020}_{-0.033}$		1st bearing cap
	Cylinder Head	$\varphi 23H_7\ ^{0.021}_{0}$	Clearance 0.020~0.054	2nd, 3rd, 4th & 5th bearing caps
	Camshaft	$\varphi 23f_6\ ^{-0.020}_{-0.033}$		2nd, 3rd, 4th & 5th bearing caps
Exhaust	Cylinder Head	$\varphi 29H_7\ ^{0.021}_{0}$	Clearance 0.020~0.054	1st bearing cap
	Camshaft	$\varphi 29f_6\ ^{-0.020}_{-0.033}$		1st bearing cap
	Cylinder Head	$\varphi 23H_7\ ^{0.021}_{0}$	Clearance 0.020~0.054	2nd, 3rd, 4th & 5th bearing caps
	Camshaft	$\varphi 23f_6\ ^{-0.020}_{-0.033}$		2nd, 3rd, 4th & 5th bearing caps

9 Fit Clearance between Tappet Hole and Tappet

Name of Component		Size and Tolerance	Clearance or Value of Interferenc	Remark
	Cylinder Head Hole	$\varphi 28H_7\ ^{0.021}_{0}$	Clearance 0.020~0.054	
	Tappet	$\varphi 28f_6\ ^{-0.020}_{-0.033}$		

Remarks: In the above tables, the capital letter and suffix following the sizes (For example, H_7 of $\varphi 28H_7$) mean the process precision, which are unconcerned with the maintenance and may be ignored in the course of maintenance.

Chapter 4. Table of Measurement Parameters of SQR472 EngineSQR472

No.	Measuring Items		Acceptance value	Remark
1	Axial clearance of crankshaft		0.089-0.211mm	
2	Torque of crankshaft when rotating at uniform speed	Assemble the crankshaft and tighten the main bearing cap bolt	≤1 Nm	
		Mount the piston connecting rod assembly and tighten the connecting rod bolt	≤5.5Nm	
			≤6Nm	
		Installing timing belt and spark plug	≤26 Nm	
	Mount the valve, spring and camshaft (excluding timing belt and spark plug) on the cyllinder head, tighten the camshaft bolt, and then measure the torque of the camshaft rotating at uniform speed		≤32 Nm	
3	Distance between the outer edge of steel ball and the front end of camshaft		5.65±0.5mm	
4	Distance between the outer edge of steel ball and the rear end of camshaft		8.65±0.5mm	
5	Axial clearance of intake camshaft		0.10~0.179	
6	Axial clearance of exhaust camshaft		0.10~0.253	
7	Jumping amount of installation surface of flywheel wearing piece		0.10mmmax	
8	Protrusion height of crankshaft woodruff key		2～2.20mm	
9	Intake valve clearance		0.18±0.05mm	
10	Exhaust valve clearance		0.25±0.05mm	
11	Tension of timing belt (When the middle part of the rigth side is pressed down for 4-5mm）		200～280N.m	
12	Compression pressure of cylinder		10~14bar	
13	Tension of generator belt （When the part between the generator and water pump is pressed down for 4-5mm）		98N.m	
14	Refilling amount of engine oil (including filter)		3.5 Liter	

Chapter 5. Table of Main Fitting Torque for SQR472 EngineSQR472

No.	Name	Specification	Quantity	Fixing Torque (Nm)	Remark
1	Main bearing cap bolt	M10X1.25	10	70±3.5	
2	Connecting rod cover bolt	M8X1	8	40±2	
3	Oil pump bolt	M8X1	6	20±1.5	
4	Nut (oil collector – oil ppump)	M6	2	6±1	
5	Bolt (oil collector – cylinder body)	M6	1	6±1	
6	Water pump bolt	M8X1	6	25±1.5	
7	Rear oil seal bracket bolt	M8	5	25±1.5	
8	Drain plug	M12	1	45±3	
9	Oil pan bolt	M6	19	6±1	
10	Bolt connecting exhaust camshaft with flange (hexagonal)	M6	4	6±1	
11	Exhaust camshaft locking nut	M40X1.5(L)	1	100±5	
12	Cylinder head bolt	M10X1.25	10	70±3.5	
13	Camshaft bearing cap bolt	M6	19	9±1	
14	Cylinder head chamber cover bolt	M6	8	4.5±0.5	
15	Camshaft position sensor bolt	M8	1	10±1	
16	Bolt (knock sensor)	M8	1	20±1.5	
17	Camshaft timing gear bolt	M12X1.25	1	100±5	
18	Tension pulley bolt	M10	1	25±3	
19	Timing cover bolt	M6	7	6±1	
20	Engine oil gauge pipe bolt	M6		6±1	
21	Flywheel assembly bolt	M10X1.25	6	70±3.5	
22	Thermoregulator shell bolt	M8	2	10±1	
23	Oil filter conncetor	3/4"-16		40±2.5	
24	Oil filter	3/4"-16		20±1.5	

25	Intake/exhaust stud	M8	16	10±1	Spread glue
26	Intake pipe nut	M8	8	25±1.5	
27	Ignition coil bracket assembly bolt	M8	2	20±1.5	
28	Front lifting lug bolt	M8	2	20±1.5	
29	Exhaust pipe nut	M8	8	25±1.5	
30	Exhaust pipe thermal shroud bolt	M6	3	6±1	
31	Bolt on crankshaft pulley & torsional damper assembly	M12X1.25	1	100±5	
32	Water pump pulley bolt	M6	4	6±1	
33	Water temperature sensor	M12X1.5	1	15±1.5	
34	Oil pressure switch		1	30±2	
35	Spark plug	M14X1.25	4	20±1	
36	Fixing Bolt of spark plug cover board)	M6	8	2.5±0.5	
37	Bolt (intake pipe front bracket)	M8	1	20±1.5	
38	Bolt (intake pipe rear bracket)	M8	4	20±1.5	
39	Bolt (throttle cable)	M6	2	6±1	
40	Bolt (gas-oil spearator bracket)	M6	2	6±1	
41	Bolt (throttle valve casing)	M6	4	6±1	
42	Oxygen sensor	M18X1.5	1	40±2	
43	Bolt (intake temperature & pressure sensor)	M4	1	3±1	
44	Fixing bolt of fuel guide rail	M6	2	7±1	
45	Ignition coil bolt	M6	3	5±1	

Chapter 6. Positions on SQR472 Engine to be Lubricated

Type of lubricating oil: Engine lubricating oil

Designation of lubricating oil: SAE10W/30-50(SF Class)

No.	Position to be lubricated	Remark
1	Joint surface of connectong rod bolt head	
2	Screw of connecting rod bolt	
3	Exicrcle of piston pin	
4	Inner wall of piston pin hole	
5	Piston and piston ring	
6	Inner wall of cylinder hole	
7	Crankshaft main neck	
8	Connecting rod shaft neck	
9	Upper & lower main bearing bushing (inside)	
10	Upper & lower connecting rod bearing bushing (inside)	
11	Crankshaft thrust plate (the side of oil gloove)	
12	Front oil seal and crankshaft front oil seal journal	
13	Rear oil seal and crankshaft rear oil seal journal	
14	Valve seat hole	
15	Valve tappet and valve pipe hole	
16	Excircle and hole of valve tappet	
17	Camshaft journal and bearing base hole	
18	Camshaft driving gear	
19	Edge and excircle of oil seal	
20	Oil seal journal and oil seal base hole	
21	Surface oil filter sealing gasket	

Chapter 7. Positions on SQR472 Engine to be Spread with Sealant SQR472

No.	Position to be spread with sealant	Type of sealant	Form and amount of sealant (reference)	Remark
1	Joingt surface of oil pan	Loctite 5699	ϕ(3~4)mm	
2	Rear oil seal bracket	Loctite 5699	ϕ(3~4)mm	
3	Valve chamber cover	Loctite 5699	ϕ(3~4)mm	
4	Joint surface if timing gear chamber cover	Loctite 5699	ϕ(3~4)mm	
5	Joint surface of camshaft cover	Loctite 5699	ϕ(3~4)mm	
6	Sealing surface of the bowl shaped plug of cylinder head	Loctite 11747	Spread uniformly	
7	Flywheel bolt	Loctite 204	0.125(ml)×6	Pre-spread @3
8	Intake pipe stud	Loctite 262	0.125(ml)×7	The part screwed into the cylinder head
9	Exhaust pipe stud	Loctite 262	0.125(ml)×6	The part screwed into the cylinder head
10	Camshaft timing gear bolt	Loctite 243	0.2ml	
11	Oil collector stud	Loctite 243	0.08(ml)×2	The part screwed into the oil pump
12	Screw of thermoregulator shell fixing bolt	Loctite 243	0.08(ml)×2	The part screwed into the cylinder head

Overhaul Info……7-2

Fuel Injector System Disassembly/ Installation……7-3

High Pressure Fuel Line Disassembly/ Installation……7-4

Throttle Body Disassembly/Installation……7-4

Fuel rail with injector assy Disassembly/Installation……7-5

Fuel injector Removal/Assembly……7-5

Overhaul Info

CAUTION

NOTE

Gasoline is highly flammable, therefore smoke and fire are strictly forbidden in the work place. Special attention should also be paid to sparks. Gasoline may also be explosive when it is vaporized, so operation should be done in a well-ventilated place.

Do not over twist or bend the cables. The twisted cables may cause poor operation.

Loose the high pressure fuel line before disassembly, discharge the fuel in the high pressure fuel line and put it in a container.

When the body of throttle valve is disassembled, the air intake shall be covered by dishcloth or tape, for avoiding the entry of other objects into the engine from the air intake side of the engine.

When the vehicle will be stored for more than one month, the gasoline in the high pressure fuel line and cap of the fuel injector must be discharged. Otherwise, the gasoline will age and form colloidal elements which may block the nozzle of fuel injector, therefore the engine cannot start or the rotate speed is unstable.

Overhaul Info

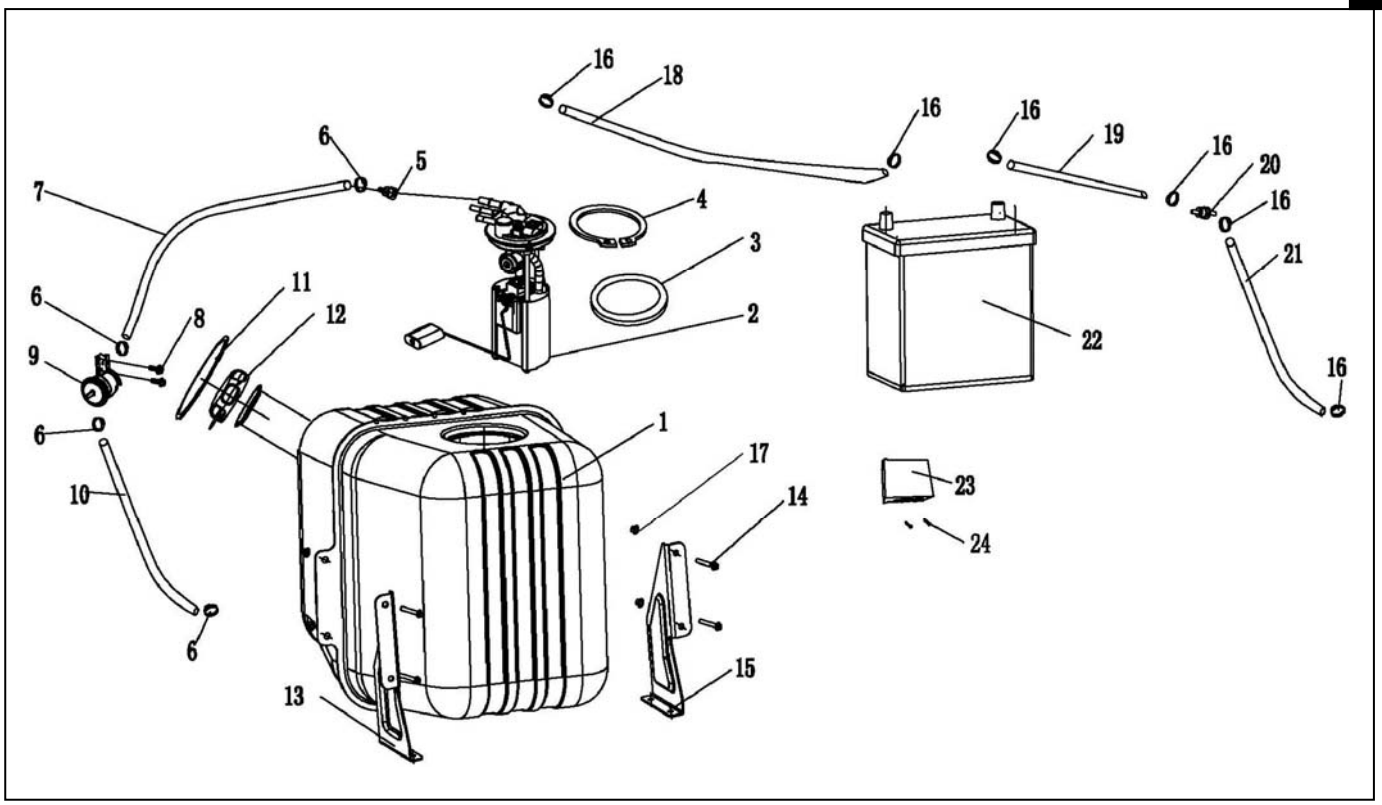
Engine Starting Failure

Too much fuel in the engine.
-Ail filter clogged.
-Idle air pipe clogged.
No fuel in the injector.
-Fuel filter clogged.
High pressure fuel line clogged.
-Fuel injector clogged.

Hard Starting/Stall After Starting, Unsteady Idle Speed

Idle air pipe clogged.
Fuel system clogged.
Ignition system not functioning properly.
Fuel tank cap clogged.

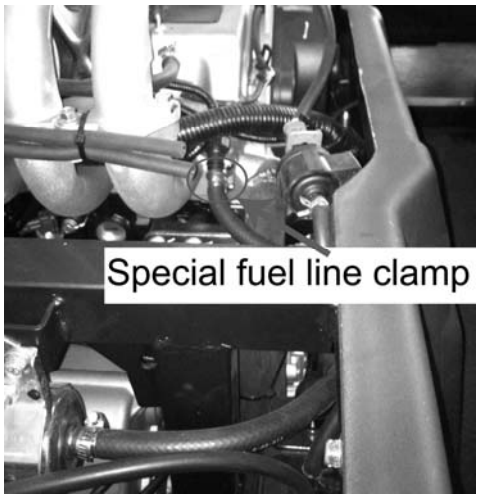
Fuel Injector System Disassembly/ Installation



1. FUEL TANK
2. FUEL PUMP
3. "0"SEAL RING(ϕ6×ϕ100)
4. HOOP（ϕ120×2）
5. JOINT,FUEL HOSE
6. CLAMP（13-19）
7. FUEL HOSE (300mm)
8. BOLT,FLANGE（M8×16）
9. FUEL FILTER ASSY
10. FUEL HOSE (400mm)
11. PROTECTIVE SLEEVE, FUEL TANK CAP
12. CAP, FUEL TANK
13. SUPPORT, FUEL TANK(L)
14. BOLT,FLANGE（M6×12）
15. SUPPORT, FUEL TANK(R)
16. CLAMP（ϕ10）
17. LOCKNUT，FLANGE(M6)
18. INLET WINDPIPE (FRONT)
19. INLET WINDPIPE (MIDDLE)
20. RELAY, CARBON CANISTER
21. INLET WINDPIPE (RAER)
22. CARBON CANISTER
23. DEAD PLATE, CARBON CANISTER
24. RIVET (5×20)

High Pressure Fuel Line Disassembly

Loosen the special fuel line clamp on fuel injector cap.
loosen the special fuel line clamp on fuel tank.
Disassemble High pressure fuel line.



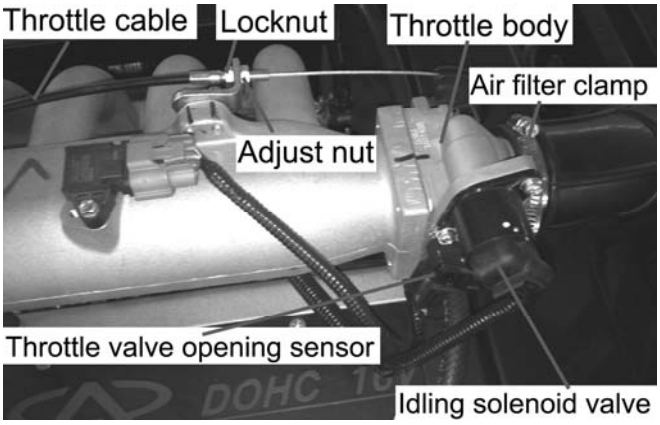
NOTE: Use container to keep the remaining fuel from high pressure fuel line, when loosening the special fuel line clamp.

High Pressure Fuel Line Installation

Reverse the disassembly procedure for installation.
Use clamp calliper to install the special fuel line clamp.

Throttle Body Disassembly

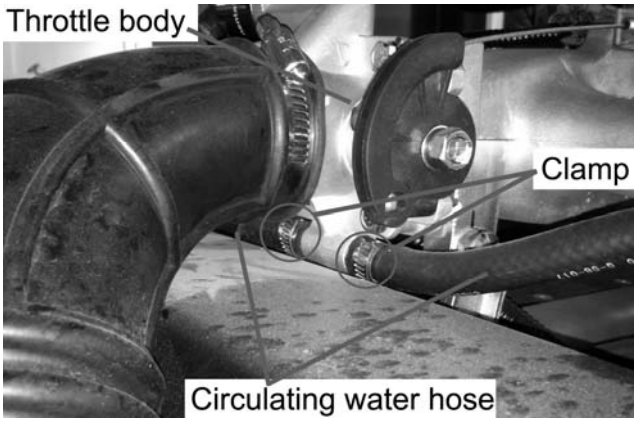
Remove the connector of throttle valve opening sensor.
Remove the connector of idling solenoid valve sensor.
Loosen locknut, remove adjust nut and remove the throttle cable from throttle rotory sleeve.
Loosen air filter clamp.
Remove intake tube of air filter.
Remove 2 clamps and remove circulating water hose.
Remove 4 bolts and remove throttle body.



NOTE: Do not adjust the bolt on throttle body.
Do not remove the cap on throttle body.

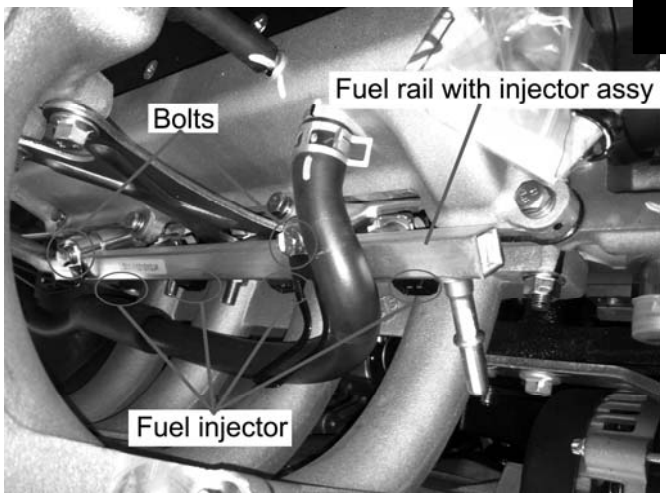
Throttle Body Installation

Reverse the disassembly procedure for installation.



Fuel rail with injector assy disassembly

Disassemble the special high pressure fuel
Remove the strap and fuel injector connector.
Disassemble 2 bolts and remove fuel rail with injector assy.

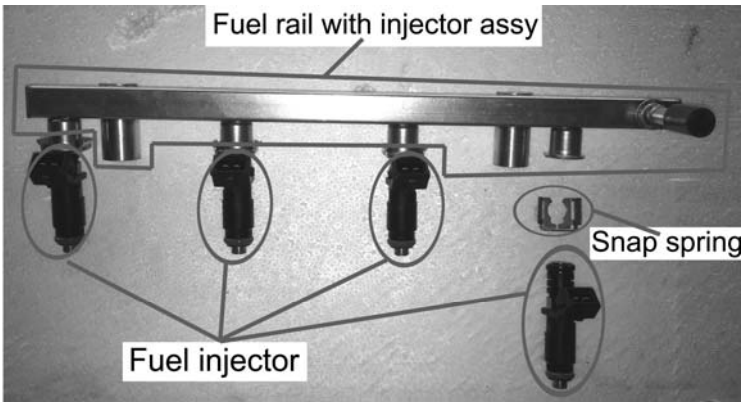


Fuel rail with injector assy installation

Reverse the disassembly procedure for installation.

Fuel injector removal

Use Slotted screwdriver to remove snap spring.
Remove fuel injector from fuel rail with injector assy.



Fuel injector assembly install

Install fuel injector into the fuel rail with injector assembly.
Press the snap spring into groove of fuel injector snap spring.

Overhaul Info……..…8-1
Troubleshooting……..…8-2
Front Wheel……...8-3
Brake System……8-4
Suspension……8-7
Steering……8-12

Overhaul Information Operating cautions Notes

- Securely support the vehicle when overhauling the front wheel and suspension system.
- Refer to chapter10 for overhaul and inspection of lighting, instruments and switches.
- Do not overexert on the wheel. Avoid any damage to the wheel.
- When removing tire, use the special tire lever and rim protector.

Maintenance Standard

Item			Standard	Service Limit
	Rim Vibration	Longitudinal	0.8mm	2.0mm
		Lateral	0.8mm	2.0mm
	Tire	Remained groove	－	3.0mm
		Tire pressure	12±0.5PSI(82.5±3.5KPa)	－
			12±0.5PSI(82.5±3.5KPa)	－
Front brake	Free play(brake lever)		0mm	－

Tightening Torque		
Nut, Tie-rod	20-30 N·m	
Lock nut, steering stem	20-30N·m	
Nut, front wheel axle	180-200 N·m	
Fixing bolt/nut, absorber（front）	30-40 N·m	
Fixing bolt/nut, absorber（rear）	30-40 N·m	
Nut, front/rear rim	40-50 N·m	
Nut, rear wheel axle	180-200 N·m	

Troubleshooting Heavy

Steering

- Steering bearing is damaged or worn
- Inner & outer bearing races are damaged, worn or stepped
- Steering stem is distored
- Tire pressure is too low
- Worn tire

Shaking Steering Wheel

- Steering wheel is not well tightened
- Steering stem is loosened or not well installed
- Mount seat, steering wheel is not well tightened
- Bearing is damaged
- Right and left shock absorbers are not matched
- Deflected tires
- Deformed frame
- Worn tiers
- Shaking of wheel bearing

Vibration of Front Wheel

- Wheel rim distorted
- Faulty wheel bearing
- Faulty tire
- Improper balance of wheels
- Improper tightening of wheel axle

Wheel Cannot Turn Freely

- Faulty wheel bearing
- Front wheel axle is bended
- Brake drag
- Faulty steering structure

Front Suspension is Too Soft

- Weakened front shock absorbers
- Tire pressure is too low

Front Suspension is Too Hard

- Front shock absorber is bended
- Tire pressure is too high

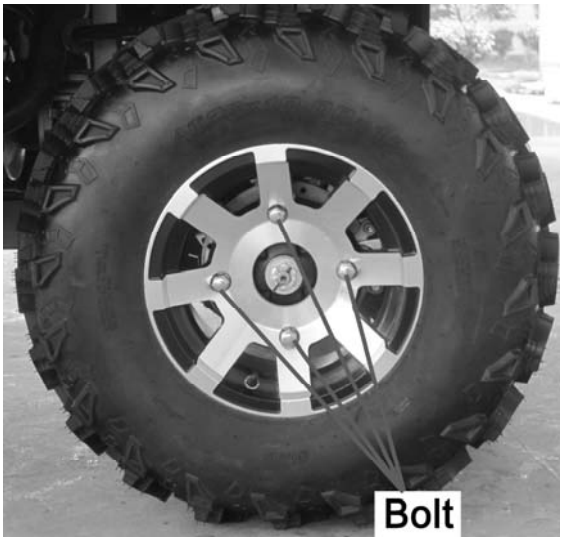
Noise with Front Absorbers

- Faulty front shock absorbers
- Loosened tightening parts of front absorbers

Poor Brake Efficiency

- Faulty brake adjustment
- Stained brake disc
- Worn brake shoes
- Air in brake hose

Front wheel



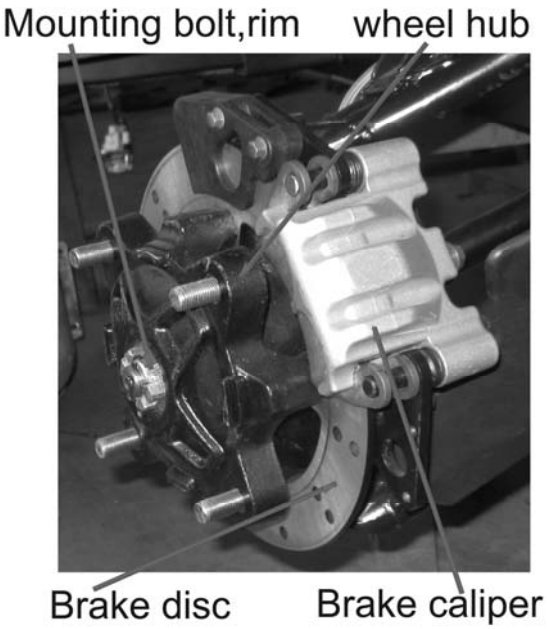
Removal
Securely support the front wheels Remove:
--Wheel cap
--4 bolts from wheel hub
--Front wheel

Inspection Rim

Damage, warpage or serious scrapes: →Replace Replace with a new one, if any. Slowly turn the wheel, measure the rim vibra-tion with a dial gauge.

Service limit: Axial: 2.0mm

Radial: 2.0mm



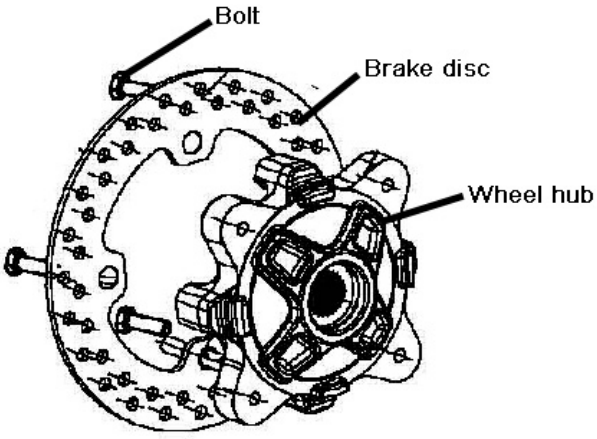
Assembly:

Press rim into wheel
Install rim on the wheel hub

Tightening Torque: Bolt, Wheel Hub：40-50 N·m

Front Wheel Hub

Disassembly
Remove:
--Front wheel (→8-3)
--Front brake caliper (→8-4)
--Rim axle nut
--Brake disc and wheel hub
--4 bolts from front brake disc
--Wheel hub



Installation
Reverse the removal procedure for installation.
Torque, Rim axle nut: 180-200N· m

Brake System

Front brake caliper

Removal

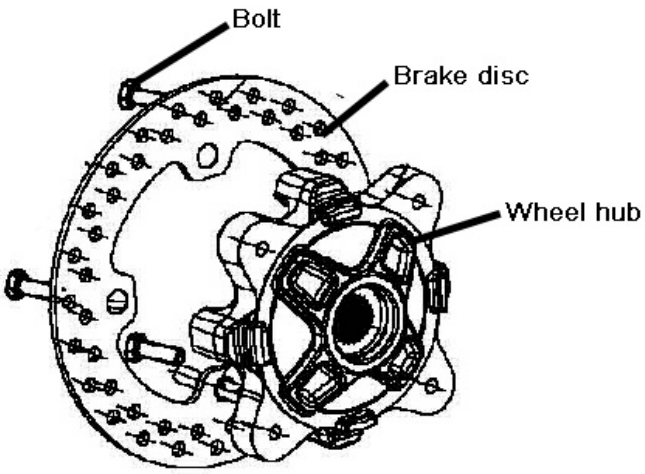
Remove:
--Front wheel（→8-3）
--2 bolts from arm
--Front caliper

Inspection

Check brake caliper for cracks and tightening parts for oil leakage.
Replace if any.

Installation

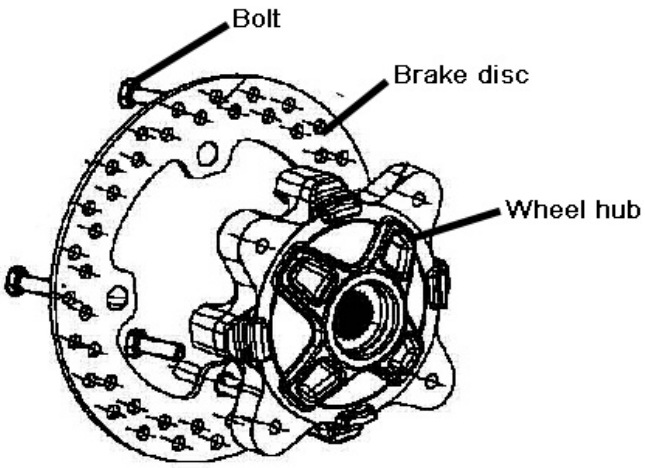
Reverse the removal procedure for installation.



Tightening Torque

Fixing Bolt, Brake Caliper: 45-50N· m.

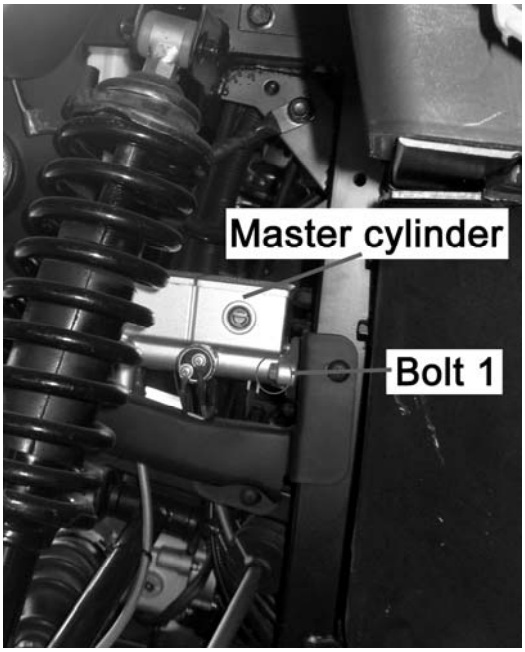
Brake Disc



Removal
Remove:
--Front wheel（→8-3）
--Brake caliper（→8-4）
--Front brake disc and wheel hub
--4 bolts from brake disc
--Brake disc

Inspection:

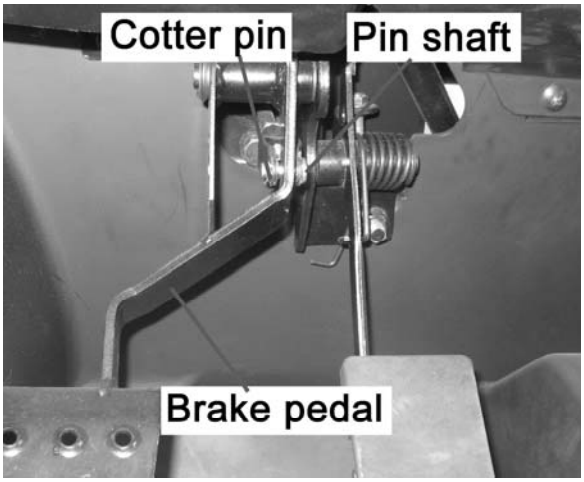
Brake disc thickness: <3mm →Replace



Installation
Install brake disc
Tightening Torque

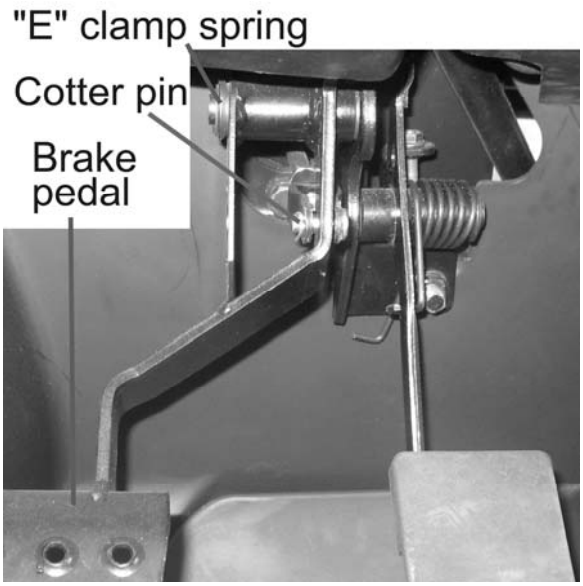
Fixing bolt, brake disc：40-50N·m

Brake Master Cylinder Disassembly
Remove:
--Blot 1
--Cotter pin
-- Pin shaft.
Do not remove brake master cylinder from vehicle unless when replacing master cylinder assembly.
Note:
Do not hang master cylinder on brake hose.
Do not put the master cylinder upside down to avoid possible entrance of air into brake system.
Keep the master cylinder in the installation position.
Proper routing of brake hose.
Check brake efficiency after installation.



Brake Pedal Removal

Remove:
--Cotter pin
-- “E” clamp spring
-- Brake Pedal
Seperate Brake Pedal from vehicle
Disassembly of front brake master cylinder
（→ 8-5 ）



Installation

Reverse the removal procedure for installation.

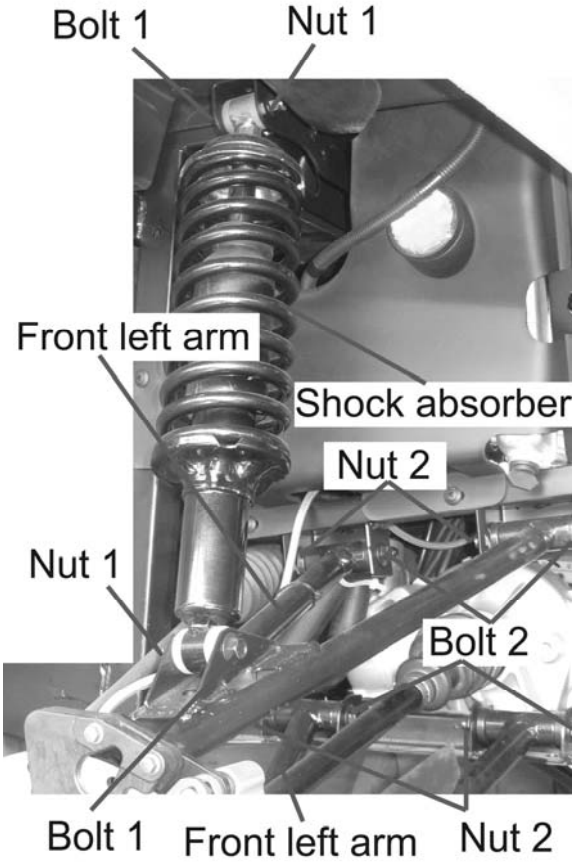
NOTE

Do not put the master cylinder upside down to avoid possible entrance of air into brake system.
Keep the master cylinder in the installation position.
Refer to Chapter1 for proper routing of brake hose.
Check brake efficiency after installation.

Front Left Suspension

NOTE:

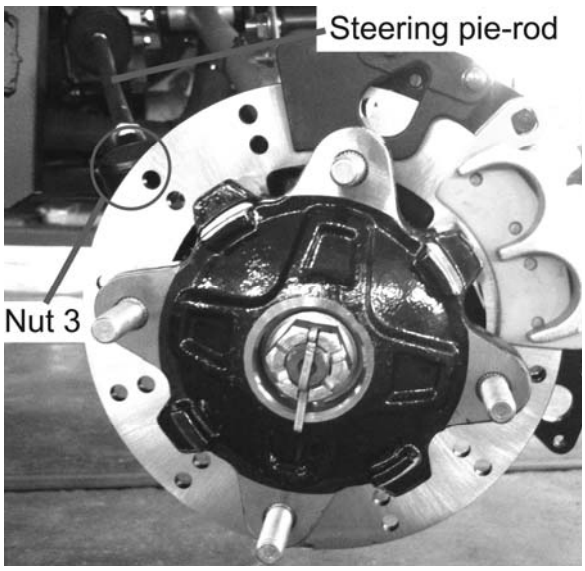
DO NOT
Remove both left and right suspension at the same time to avoid fall down of the vehicle.
Park the vehicle on a level ground and securely support front part of the vehicle.



Removal:

Remove:
--Front wheel(→8-3)
--Front wheel hub(→8-3)
--Front brake caliper(→8-4)
--Bolt1, Nut1.
--Shock absorber.

--Bolt2, Nut to Bolt2 for Front Left Arm (Upper)

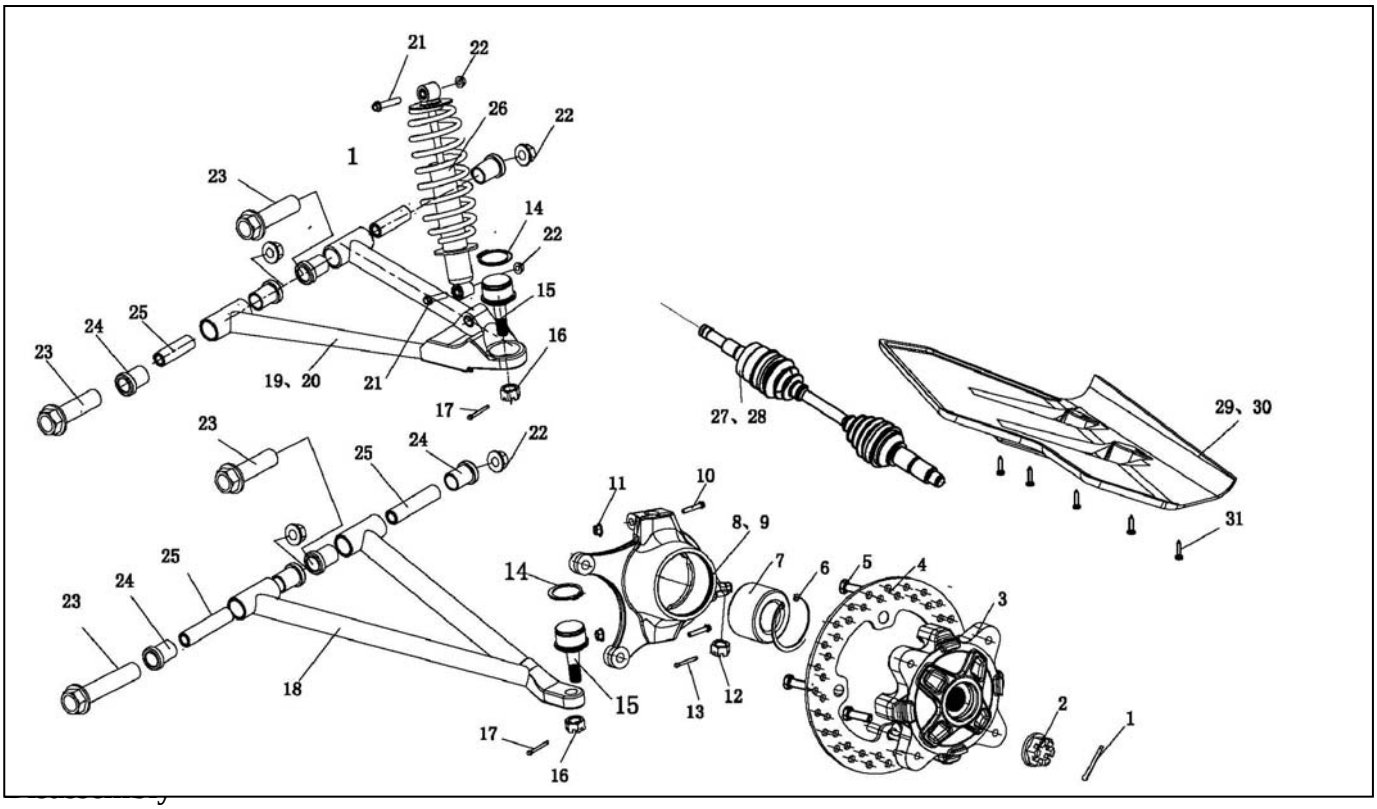


--Bolt2, Nut to Bolt2 for Front Left Arm (Lower)

-- Remove steering tie-rod ball pin slot nut 3
-- Remove steering tie-rod.

Pull up joint knuckle from the driveshaft, remove front left suspension assy.

1. COTTER PIN（3×25） 2. NUT(Rear wheel axle)
3. FRONT WHEEL HUB 4. FRONT BRAKE DISC
5. BOLT(M10×25) 6. CIRCLIP (φ72)
7. BEARING 8. FRONT STEERING KNUCKLE(L) 9. FRONT STEERING KNUCKLE(R)
10. BOLT，FLANGE（M8×55）
11. LOCKNUT，FLANGE(M8) 12. NUT（M10×1.25）
13. PIN, SPLIT（2.5×20） 14. CIRCLIP(φ32)
15. JOINT,ARM BALL 16. SCREW CAP，DRIVE AXLETREE M12 17. PIN, SPLIT（3×30）
18. FRONT LOWER ARM 19. FRONT LEFT ARM (UPPER) 20. FRONT RIGHT ARM (UPPER)
21. BOLT，FLANGE（M10×1.25×50）
22. LOCKNUT，FLANGE(M10×1.25)
23 . BOLT，FLANGE（M10×1.25×90）
24. BUSH ,ARM 25. CENTER SPACER
26. FRONT SHOCK ABSORBER
27 . FRONT CV JOINT(L)
28. FRONT CV JOINT(R)
29. SUSPENSION PROTECTOR(L)
30. SUSPENSION PROTECTOR(R)
31. SCREW,TAP（ST4.2×20）



Disassembly

Front Left Shock Absorber

Disassembly

ATTENTION: You do not need to remove any other parts if you only replace the front suspension.

Park the vehicle on a level ground,

Remove front left shock absorber's bolt, nut installed in arm.

Remove front left shock absorber.

Inspection

Inspect the shock for oil leakage, oil seal damage, destroy, replace if needed.

Installation

Reverse the removal procedure for installation.

Refer to front left shock absorber for removal, installation and inspection of front right shock absorber.

Arm Assembly

Attention: There are 8 suspension arms in the vehicle, they dismantle, inspection and assemble in the same way. So here only introduce the way to dismantle, inspection and assemble the front left upper arm and the front right lower arm. Other arm assemble refers to the above.

Front Right Suspension

NOTE:

DO NOT
Remove both left and right suspension at the same time to avoid fall down of the vehicle.
Park the vehicle on a level ground and securely support front part of the vehicle.

Removal:

Remove:
--Front wheel(→8-3)
--Front wheel hub(→8-3)
--Front brake caliper(→8-4)
--Bolt1, Nut1.
--Front Right Shock absorber.

--Bolt, Nut to Bolt for Front Right Arm (Upper)

--Bolt, Nut to Bolt for Front Right Arm (Lower)

-- Remove steering tie-rod ball pin slot nut
-- Remove steering tie-rod.

Pull up joint knuckle from the driveshaft, remove front right suspension assy.

Disassembly

Front Right Shock Absorber

Disassembly

ATTENTION: You do not need to remove any other parts if you only replace the front suspension.

Park the vehicle on a level ground,
Remove front right shock absorber's bolt, nut installed in arm.
Remove front right shock absorber.

Inspection

Inspect the shock for oil leakage, oil seal damage, destroy, replace if needed.

Constant Velocity Drive Shaft

NOTE： The removal, inspection and installation of Left and Right Constant Velocity Drive Shafts of the Front/Rear Axles are the same. The following will give instruction only on the removal, inspection and inspection of Left Constant Velocity Drive Shaft of Front Axle. Refer to Left Constant Velocity Drive Shaft for removal, inspection and installation of other drive shafts.

Left Constant Velocity Drive Shaft, Front Axle

Removal

NOTE: Maintenance of Left Constant Velocity Drive Shaft of Front Axle only does not require removal of Front Suspension.
Remove:
--Front left wheel(→ 8-3)
--Front left brake caliper(→ 8-4)
--Front left wheel hub(→ 8-3)
Check dust boot.
Damaged dust boot: → Replace
Shake constant velocity drive shaft, check the agility of rzeppa universal joint, free turning of bearing, and any gap between rzeppa constant velocity joint and spline.
Stagnated turning, noise, gap with spline:
→ Replace
Warning:
An accident may occur if the rzeppa constant velocity joint cannot turn freely because of the loss of control of wheel steering.

Installation

Press ball pin into arm with special tool.
Reverse the removal procedure for installation.

Note: No shaking with the installed left and right arms. Replace arms if any. Tightening Torque：45～ 50N • m

Steering System

Cover, Steering Stem

Removal
Remove cover, steering stem（→Chapter 2）

Combination Switch

Removal

Remove combination switch（→ 2-3）

Rear View Mirror

Removal

Remove left and right rear view mirrors.

Note: Left rear view mirror is right-threaded.
Turn counter clockwise for
removal.

Note: Right rear view mirror is left-threaded.
Turn clockwise for removal.

Steering Stem

Removal

Remove:
--Steering wheel（→ 2-2）

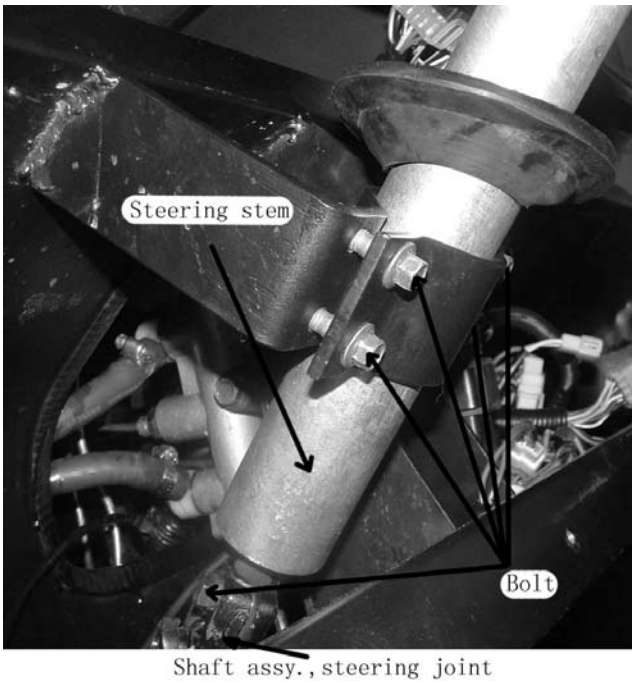
-- cover, steering stem（→ 2-2）

--Combination switch（→ 2-3）

--Bolt

--Shaft assy., steering joint

--Steering stem



Shaft assy.，steering joint

Installation of Combination Switch

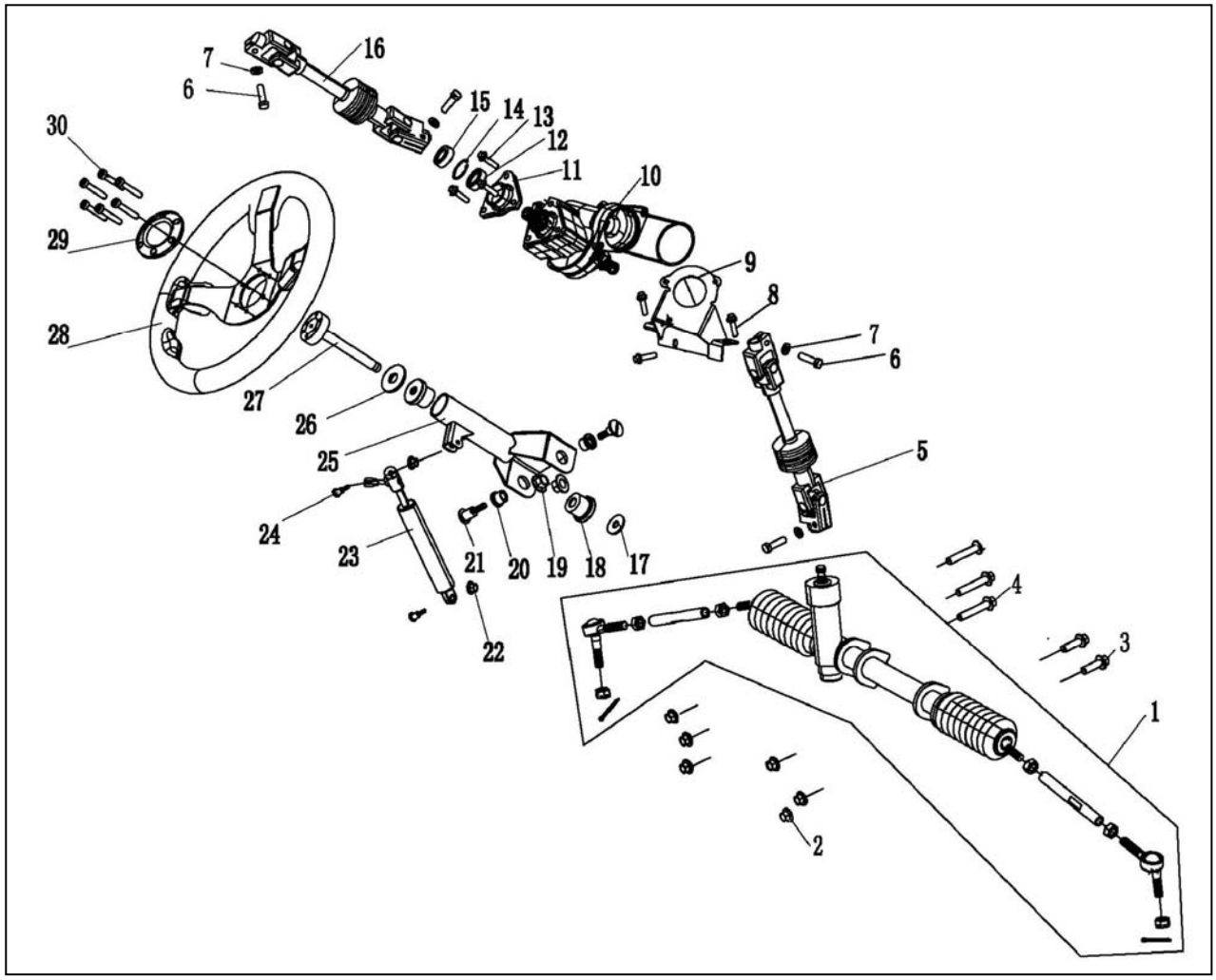
Install combination switch（→ 2-11）

Insert main cable with connector of combination switch.

Installation of Steering Wheel

Install steering wheel（→ 2-2）

Steering System



1. STEERING ASSY 2. LOCKNUT，FLANGE(M8) 3. BOLT，FLANGE（M8×16）
4. BOLT，FLANGE（M8×90） 5. STEERING SHAFT 6. BOLT，FLANGE（M8×25）
7. SPRING WASHER (Φ8) 8. BRACKET,STEERING STRENGTHENER
9. BOLT，FLANGE（M8×25） 10. STEERING STRENGTHENER 11. FLANGE,STEERING STRENGTHENER 12. BEARING 13. BOLT,FLANGE(M8×30) 14. CIRCLIP(ϕ30)
15. OIL SEAL,STEERING STRENGTHENER 16. STEERING SHAFT(TOP)
17. GASKET(ϕ14×ϕ26×3) 18. SPACER BUSH (NYLON) 19. LOCKING NUT(M8)
20. SPACER BUSH (NYLON) 21. BOLT, STEERING COLUMN 22. LOCKING NUT(M6)
23. GAS SRPING,STEERING COLUMN 24. BOLT(M6) 25. STEERING COLUMN
26. SPRING WASHER 27. CORE SHAFT, STEERING 28. STEERING WHEEL ASSY
29. DECORATING COVER 30. BOLT (M5×15)

Overhaul Info……9-1
Troubleshooting……9-2
Rear wheel……9-3
Rear brake……9-4
Rear suspension……9-5

9

Overhaul info:

Note:

- Securely support the vehicle when overhauling the rim and suspension system.
- Use genuine parts of bolts and nuts for rear rim and suspension.
- Do not overexert on the wheels to avoid possible damage to the wheels.
- When removing tire from rim, use special tire lever and rim protector to avoid damage to the rim.

Overhaul standard

Item			Standard	Limit
Rear wheel	Rim vibration	Longitudinal	-	2.0mm
		Horizontal	-	2.0mm
	Tire	Remained Tire Tread	-	3.0mm
		Tire pressure(front)	12±0.5PSI(82.5±3.5KPa)	-
		Tire pressure(rear)	12±0.5PSI(82.5±3.5KPa)	-
Rear brake	Brake pedal Free Play		0mm	-

Tightening torque	
Rear wheel axle nut	180-200N.m
Rim mounting bolt	40-50N.m
Front mounting bolt, Shock absorber	30-40N.m
Rear mounting bolt, Shock absorber	30-40N.m

Troubleshooting

Rear wheel wobbles

- Rim warpage
- Faulty tire.
- Tire pressure too low
- Improper wheel balance
- Improper tightening of wheel axle nut
- Loosened wheel nut

Rear shock absorber is too soft

- Weak spring.
- Oil leakage from rear shock absorber

Rear shock absorber is too hard.

- Bent rear shock absorber
- Tire pressure is too high

Poor brake efficiency

- Improper brake adjustment
- Stained brake pad or brake disk
- Worn or damaged brake pad

Rear wheel removal:

Refer to front wheel remove.（→8-3）

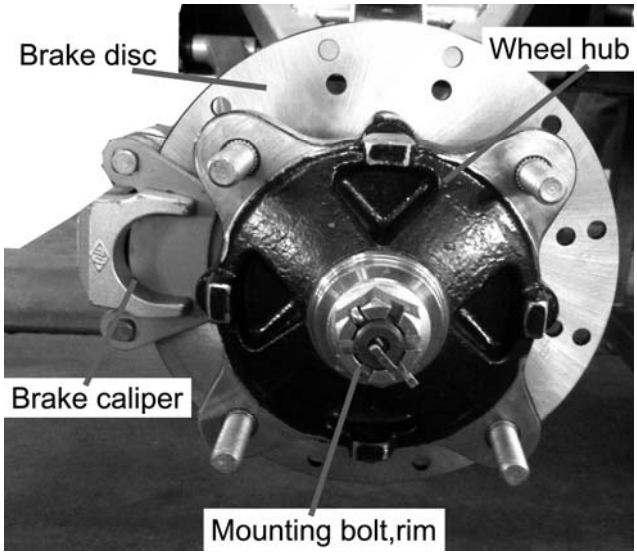
Inspection Rim:

Damage, warpage, serious scrapes, etc. Replace if necessary.

Slowly turn the wheel, measure the rim vibration with a dial gauge.

Service limit：Axial: 2.0mm

Radial: 2.0mm



Installation:

Refer to front wheel installation.（→8-3）

Wheel hub removal:

Remove rear wheel (→9-3）

Remove brake caliper.

Remove mounting bolt, rim;

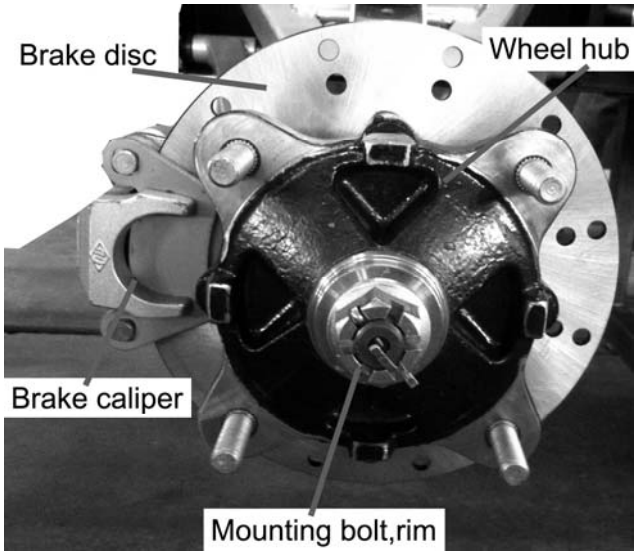
Remove wheel hub;

Installation:

Reverse the removal procedure for installation

Tightening torque, Rim Axle Nut：180-200N.m

Rear Brake



Rear Brake Caliper

- Remove:
- Rear right wheel（→9-3）
- 2 bolts from arm
- Brake caliper

Inspection:

Brake Caliper:

Cracks, Oil leakage: → Replace

Installation

Reverse the removal procedure
for installation.

Note:

Refer to Chapter 1 for brake hose routing

Rear Brake Disc

Remove:

- Rear left wheel（→9-3）
- Remove mounting bolt, rim;
- Remove wheel hub;
- Rear brake caliper (→9-4)
- Rear brake disc（→8-3）

Inspection Brake Disc:

Thickness< 3mm: →Replace

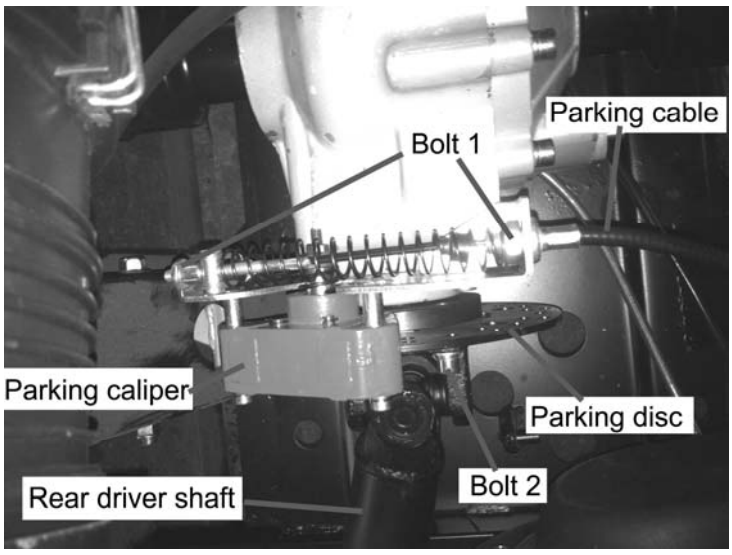
Installation

Reverse the steps of removal for installation.

Note:

Refer to Chapter 1 for brake hose routing.

Parking caliper



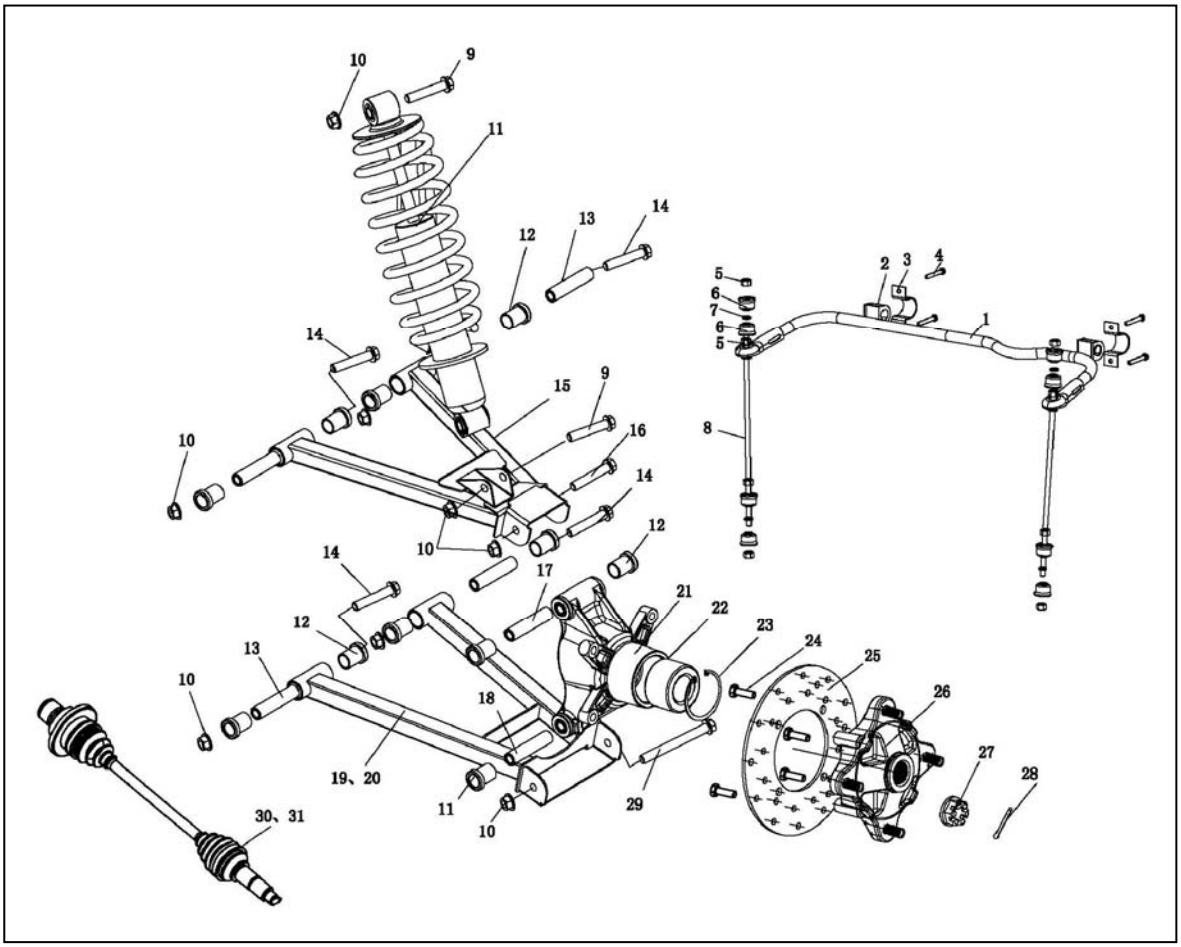
Remove rear wheel（→9-3）
Loosen the bolt 1
Remove the parking cable.
Remove bolt 2.
Remove rear drive shaft.
Remove parking caliper.
Remove parking disc.

Rear Suspension System

Rear Right Suspension

NOTE

DO NOT remove both left and right suspension at the same time to avoid fall down of the vehicle.



1. REAR STABILIZER BAR 2. RUBBER WASHER 3. HOLDER
4. BOLT,FLANGE(M8×20) 5. NUT（M10） 6. STABILIZER,CUSHION RUBBER
7. WASHER（ϕ11×φ30×2.8) 8. STABILIZER BOLT 9. BOLT，FLANGE（M10×1.25×50）
10. LOCKNUT，FLANGE(M10×1.25) 11. REAR SHOCK ABSORBER 12. BUSH ,ARM
13. CENTER SPACER 14. BOLT，FLANGE（M10×1.25×90） 15. REAR UPPER ARM ASSY
16. BOLT，FLANGE（M10×1.25×110） 17. BUSH, RR KNUCKLE（S） 18. BUSH, RR KNUCKLE（L）
19. REAR LEFT ARM（LOWER） 20. REAR RIGHT ARM（LOWER） 21. REAR STEERING KNUCKLE
22. BEARING 23. CIRCLIP(φ75) 24. BOLT，FLANGE（M10×25） 25. REAR BRAKE DISC
26. REAR WHEEL HUB 27. NUT 28. COTTER PIN（3×25） 29. BOLT，FLANGE（M10×1.25×135）
30. REAR CV JOINT(L) 31. REAR CV JOINT(R)

Disassembly

Stabilizer Bar

Remove:

1. RUBBER WASHER (2); HOLDER (3) 3. BOLT, FLANGE M8×20 (4)
NUT (5); CUSHION RUBBER (6); WASHERφ11×φ30×2.8 (7); STABILIZER BOLT (8)

Remove Stabilizer Bar,

Installation:

Reverse the removal procedure for
installation

Right rear absorber

Removal:

Note: Securely support the vehicle when removing rear left and right absorbers.

Maintenance of rear absorbers only does not require removal of rear suspension.

Remove the following parts for rear right shock absorber:

(11) Bolt (9)
(12) Nut (10)
(11) Bolt (9)
(12) Nut (10)

Remove rear right shock absorber.

Installation:

Reverse the removal procedure for installation.

Rear Right Arm

Refer to **front right Arm** in Chapter 8 for the removal, inspection and installation of **Rear Right Arm**

Rear Left Suspension

Refer to **Rear Right Suspension** for the removal, inspection and installation of **Rear Left Suspension.**

Front/Rear Axle Overhaul Information

● Standard

Lubricating Period				
Item		Capacity	Replaced	
			Initially	Afterwards
Front Axle	SAE15W/40 SF or SAE85W/90 GL-5	I:0.28L/R: 0.25L	350km	5000Km
Rear Axle		I:0.48L/R:0.45L		

I= Initial, R=Replaced

Tightening Torque Table				
Item	Qty	Type	Torque(N.m)	Remark
Fornt axle bolt	6	M8×1.25×25	20	
Screw	2	M4×22	10	
Screw	2	M5×15	10	
Screw	1	M6×16	12	
Screw	3	M6×25	13	
Screw	1	M12×10	15	
Front screw	1	M12×1.5	70	Glue
Bolt	6	M10×1.25×20	35	
Front axle bolt	1	M18×1.25×8	20	
Bolt	1	M10×1.25×12	25	
Bearing Retainer	1	M65×2.0HL	60	
Rear axle bolt	2	M10×20	30	
Rear axle bolt	6	M8×40	25	
Rear axle bolt	1	M8×20	25	
Bolt	4	M6×10	15	
Rear axle bolt	1	M6×16	15	

Inspection & Overhaul

Inspection and overhaul if any of problems below happens to front and rear axle.

Descriptions	Causes
1. Unstable moving during accelerating, decelerating or constant speed. 2. Abnormal sound in front rear axle; 3. Engine power transmission failure to front or rear wheels.	A. Bearing broken; B. Gear clearance over/under size; C. Gear severely worn; D. Gear blocked; E. Drive shaft broken F. lack of lubricant G. Foreign matter in front or rear gear

Note：A、B、C problems are hard to distinguish. Analysis is needed based on actual break-down catagories. Make sure engine works all right before disassembly of front or rear axle

Observation and Judgement

1. Never ignore abnormal sound:

a. Abnormal sounds during accelerating, decelerating have little to do with engine working, but possibly with gear worn.

b. Constant abnormal sounds during accelerating or decelerating might be cause by gear clearance wrongly adjusted during assembling.

Note: Wrong assembly or adjustment of the front or rear axle will aggravate gear worn and block;

c. Slight sounds will be noticed during low-speed driving, and should not be heard during high-speed driving. This is caused by gear block.

Note：In case of above mentioned times, stop the vehicle immediately for inspection until they are solved, or will cause accident.

2. Check lubrication;

3. Check lubricant leakage;

a. Rear axle surface oil stain inspection before through inspection;

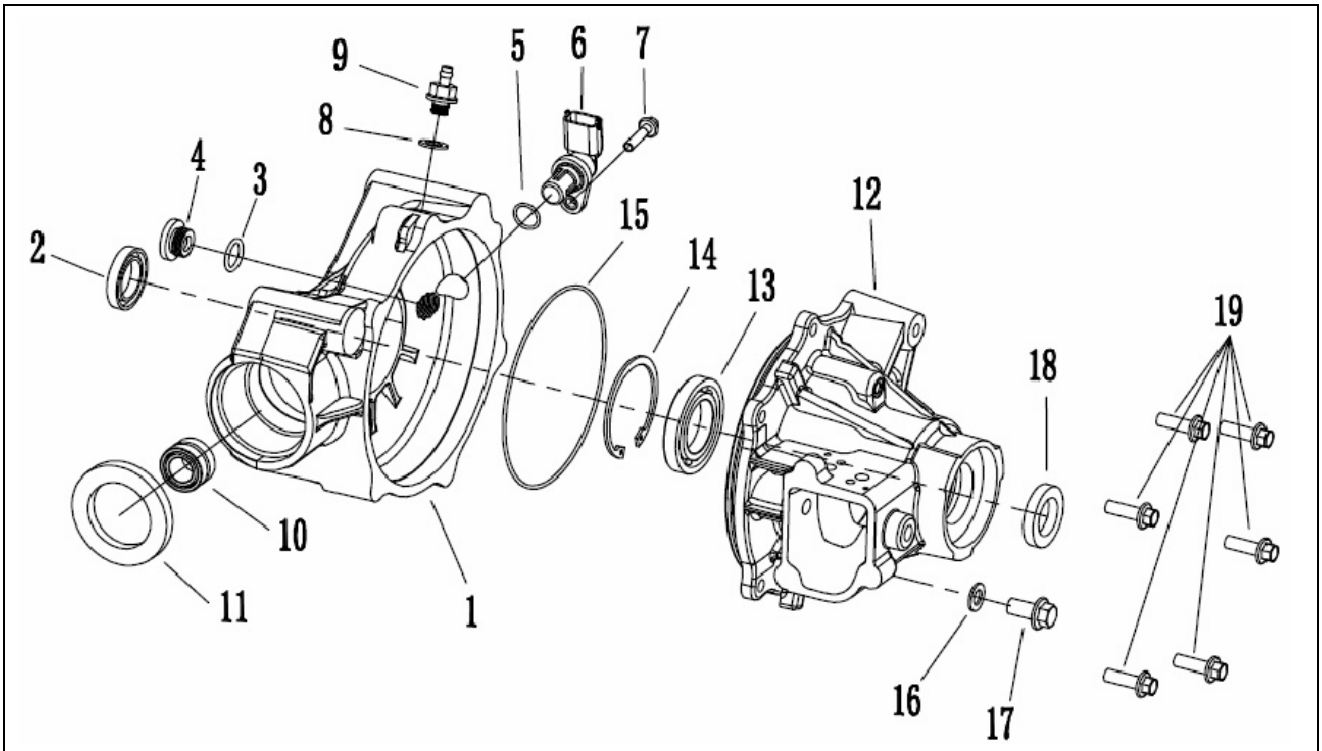
b. Oil stain on ground on the parking lot;

c. Lubricant splash inspection. Check if there is gear case or oil seal leakage.

Replace broken parts if necessary.

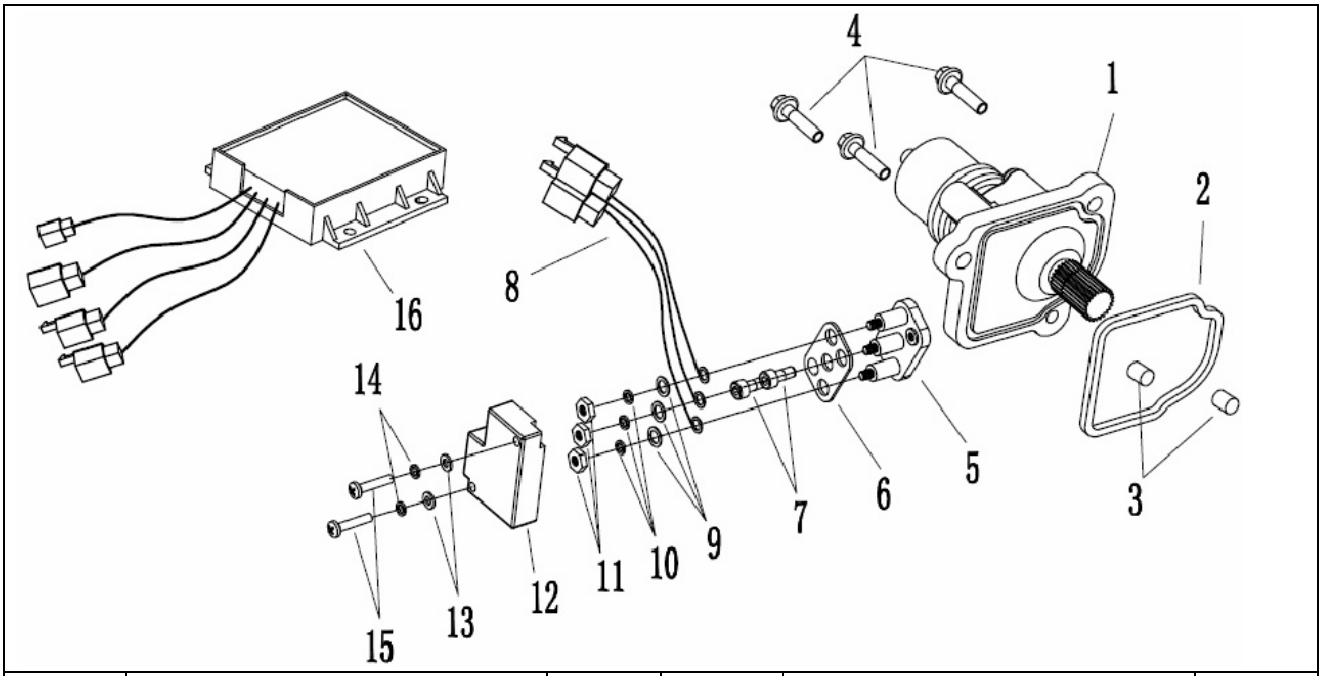
Disassembly of front axle

1. FRONT AXLE HOUSING GROUP



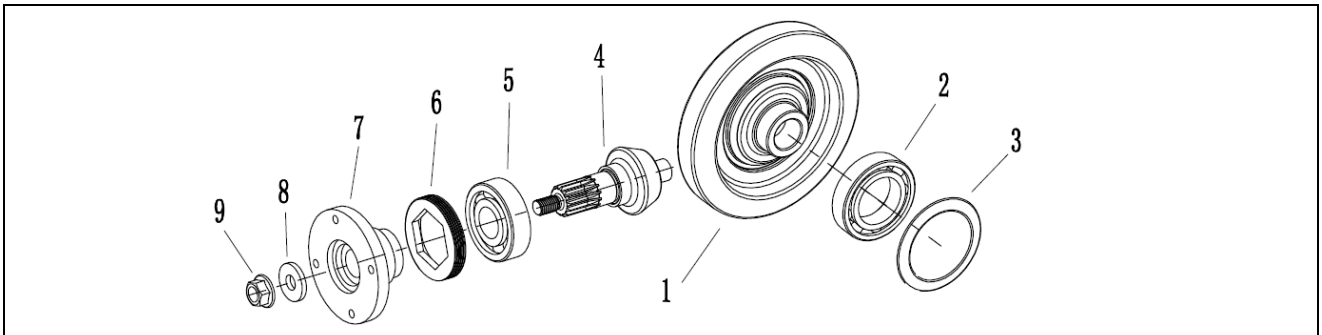
Ref.No	Description	QTY	Ref.No	Description	QTY
1	FRONT AXLE LEFT CASE	1	11	OIL SEAL (45×68×8)	1
2	OIL SEAL (25×40×7)	1	12	FRONT AXLE RIGHT CASE	1
3	O-RING (ϕ 16.5× ϕ 2.5)	1	13	BEARING (16007)	1
4	BOLT(M18×1.5×10)	1	14	CIRCLIP(62)	1
5	O-RING(ϕ 15.5× ϕ 1.5)	1	15	O-RING(ϕ 160× ϕ 3)	1
6	SPEED SENSOR	1	16	ALUNINUM PAD(ϕ 18× ϕ 10×1.5)	1
7	BOLT,FLANGE(M6×16)	1	17	BOLT,FLANGE(M10×1.25×12)	1
8	ALUNINUM PAD(ϕ 18× ϕ 10×1.5)	1	18	OIL SEAL(25×40×7)	1
9	JOINT, BREATHER PIPE （M10×1.25×10）	1	19	BOLT,FLANGE(M8×1.25×25)	6
10	NEEDLE BEARING(NA5903)	1			

2. TWO-FOUR-DRIVE CONVERSION MECHANISM FOR GROUP



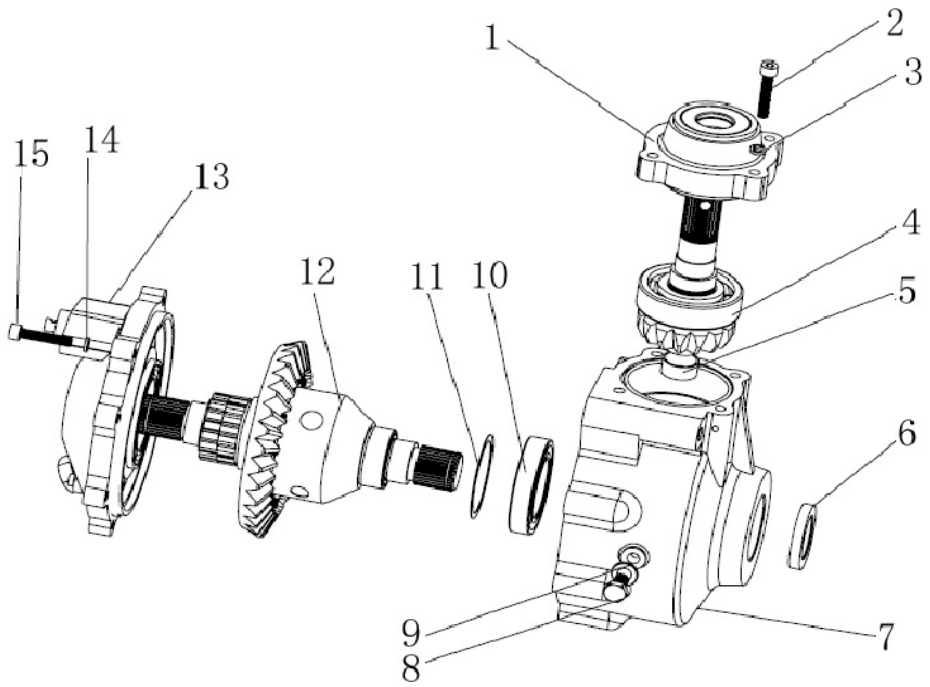
Ref.No	Description	QTY	Ref.No	Description	QTY
1	GEAR MOTOR	1	9	WASHER(ϕ 8× ϕ 4×1)	3
2	RING	1	10	SPRING PAD 4	3
3	DOWEL PIN(ϕ 8×10)	2	11	HEX NUT	3
4	BOLT,FLANGE(M6×25)	3	12	CONTACT COVER	1
5	CONNTACT COMPONENTS	1	13	WASHER(ϕ 8× ϕ 4×1)	2
6	GASKET	1	14	SPRING PAD	2
7	SCREW	2	15	SCREW(M4×22)	2
8	CONTACT WIRE	1	16	DIFFERENTIAL CONTROLLER	1

3. FRONT AXLE HOUSING GROUP



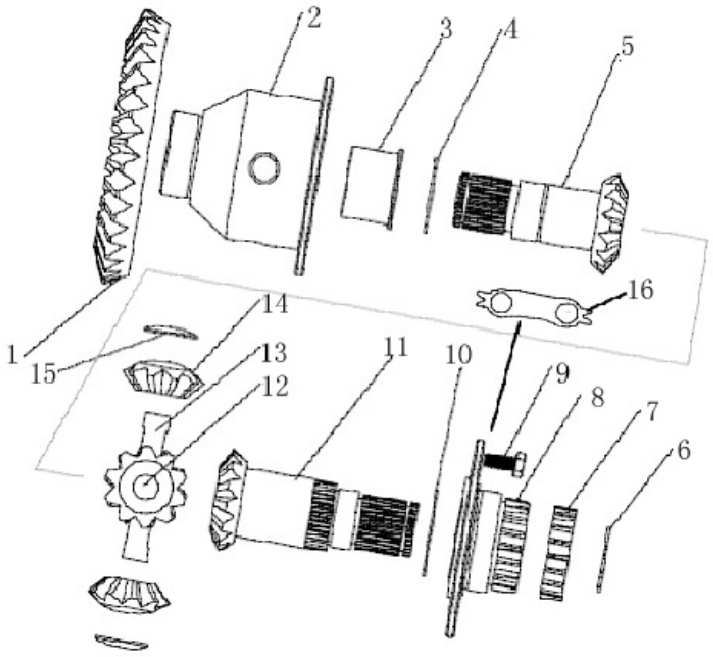
Ref.No	Description	QTY	Ref.No	Description	QTY
1	DRIVEN BEVEL GEAR FRONT ASLE（LEVOROTARY/Z=33）	1	6	BEARING RETAINER（M65×2.0HL）	1
2	BEARING（6008/P6）	1	7	COUPLER（14T）	1
3	ADJUST WASHER B （ ϕ 54× ϕ 66×0.2）	1	8	WASHER（ ϕ 12× ϕ 30×4）	1
4	DRIVE PINION GEAR（DEXTRAL /9T）	1	9	NUT FLANGE（M12×1.25）	1
5	BEARING（TM6305）	1			

4. REAR AXLE HOUSING GROUP



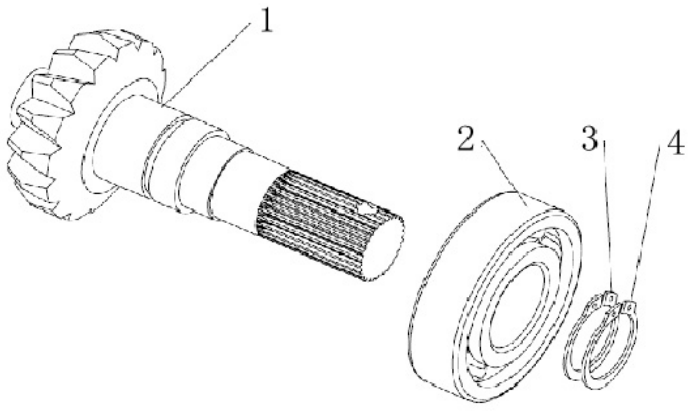
Ref.No	Description	QTY	Ref.No	Description	QTY
1	GEAR MOTOR ASSEMBLY	1	9	WASHER	1
2	BOLT M8*40	4	10	BEARING 6010	1
3	SPRING WASHER φ8.5-2.5	4	11	ADJUST WASHER	1
4	DRIVE GEAR ASSEMBLY	1	12	DIFFERENTIAL GEAR ASSEMBLY	1
5	BEARING NA2512	1	13	DIFFERENTIAL GEAR CASE	1
6	OIL SEAL 35*55*8	1	14	SPRING WASHER φ8.5-2.5	8
7	FRONT DIFFERENTIAL GEAR CASE COVER	1	15	BOLT M8*40	8
8	DRAIN BOLT M10*20	1	16		

5. REAR AXLE HOUSING GROUP



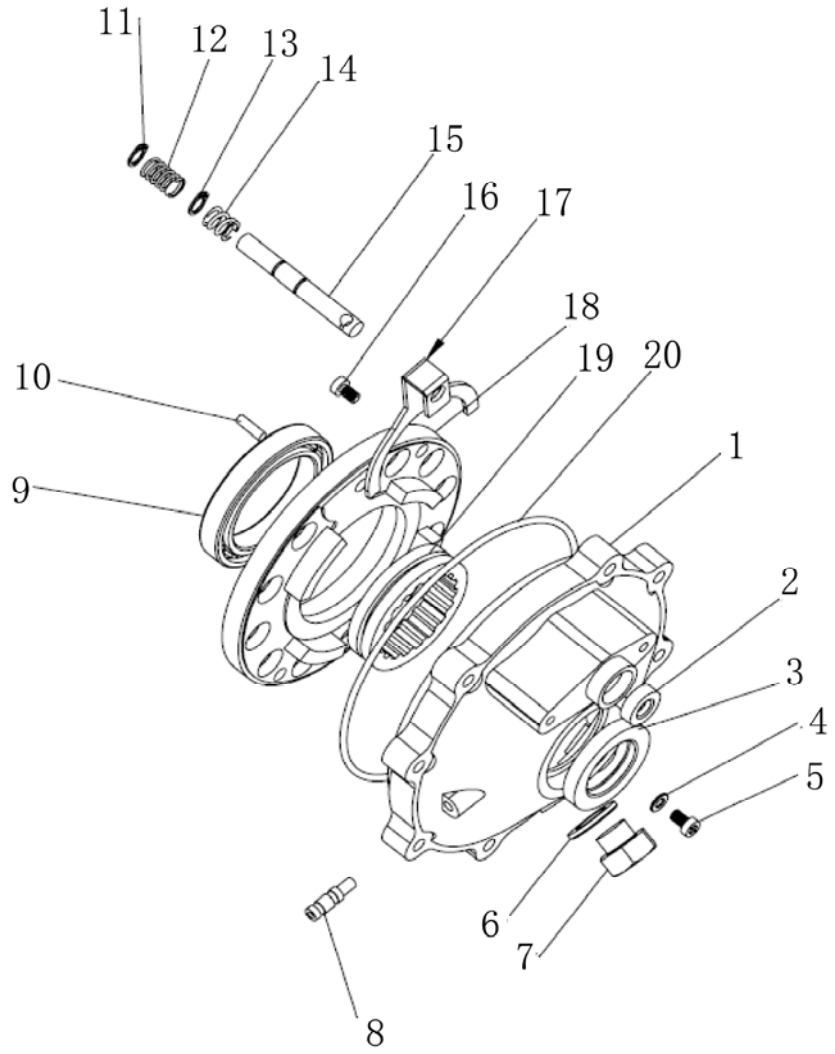
Ref.No	Description	QTY	Ref.No	Description	QTY
1	DRIVEN GEAR	1	9	BOLT M8*1*20	12
2	SUPPORT，DIFFERENTIAL GEAR, R	1	10	ADJUST WASHER	1
3	BUSH	1	11	GEAR,SHAFT SET, R	1
4	ADJUST WASHER	1	12	PLANET GEAR SHAFT 1	1
5	GEAR,SHAFT SET, R	1	13	PLANET GEAR SHAFT 2	1
6	RETAINER φ35	2	14	PLANET GEAR	4
7	LINK GEAR	1	15	SPHERE WASHER	4
8	SUPPORT，DIFFERENTIAL GEAR, L	1	16	RETAINER WASHER	6

6. REAR AXLE HOUSING GROUP



Ref.No	Description	QTY	Ref.No	Description	QTY
1	DRIVE GEAR	1	3	RETAINER φ35	1
2	BEARING 6307	1	4	RETAINER φ35	1

7. REAR AXLE HOUSING GROUP



Ref.No	Description	QTY	Ref.No	Description	QTY
1	FRONT DIFFERENTIAL GEAR CASE	1	11	RETAINER φ10	1
2	OIL SEAL 10*22*7	1	12	SPRING	1
3	OIL SEAL 35*55*8	1	13	RETAINER φ10	1
4	WASHER Φ6*1	1	14	SPRING	1
5	BOLT M6*10	1	15	RETAINER GUIDE BAR	1
6	WASHER	1	16	BOLT M6*16	2
7	STOPPER	1	17	RETAINER SHIFT FORK	1
8	EXHAUST VALVE	1	18	INNER COVER	1
9	BEARING 61912	1	19	RETAINER	1
10	SHAFT φ5*20	1	20	O-RING 160*2.65	1

Inspection after front axle disassembly

- Check if there is damage or crack on the front differential gear case cover and bearing assembling hole is ok. Replace case cover if necessary;

- Check if front axle bearing clearance ok or turning stable, and roll way, steel ball, needle and plate are ok. Replace bearing if necessary.(Using special tools)

- Check if oil seal lips and O-ring shape are ok. Replace if necessary;

- Check cylndrical surface of front axle and oil seal lips. Replace broken parts if necessary;

- Check drive pinion gear and differential gear, inspect worn surface. Replace broken if necessary;

- Check driven gears surface, gear(center)differential, bracket differential wearing situation on the differential gear assembly. Replace parts if necessary;

- Check inside and outside spline washer wearing status in front axle. Replace parts if necessary;

- Check gear motor working status. Replace with new parts if necessary;

Gear motor inspection must be carried out with special equipment or acted on the vehicle;

- Check other parts. Replace broken parts of necessary.

Front axle assembly and adjustment

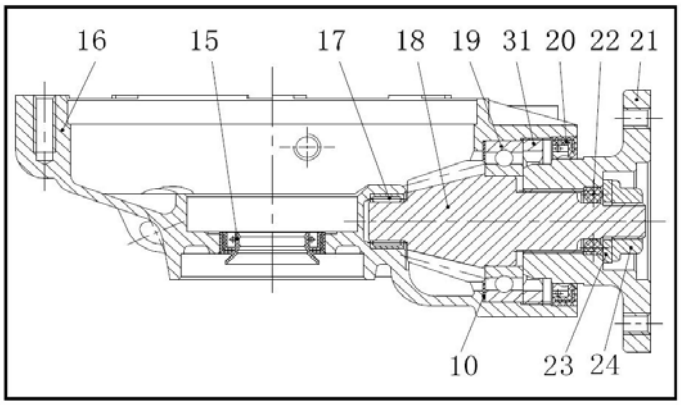
● Front axle case cover assembly

Item“31”tightening torque60Nm

Item“24”tightening torque70Nm

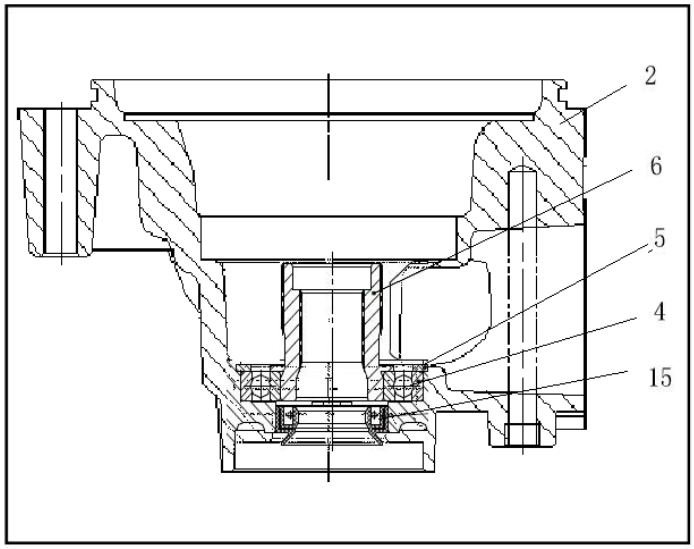
Note: Use engine oil for oil seal, bearing and drive clutch assembly;

“ 24” Use screw thread fastening glue;



● Front differential gear case cover assembly;

Note: Use engine oil for oil seal or bearing assembly.

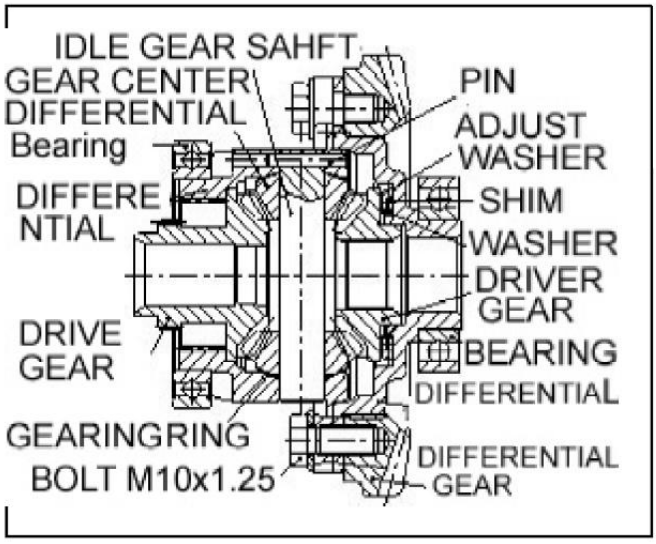


● Differential gear assembly

M10×1.25×20,Tightening torque35Nm

Note ： Use engine for bearing and differential gear;;

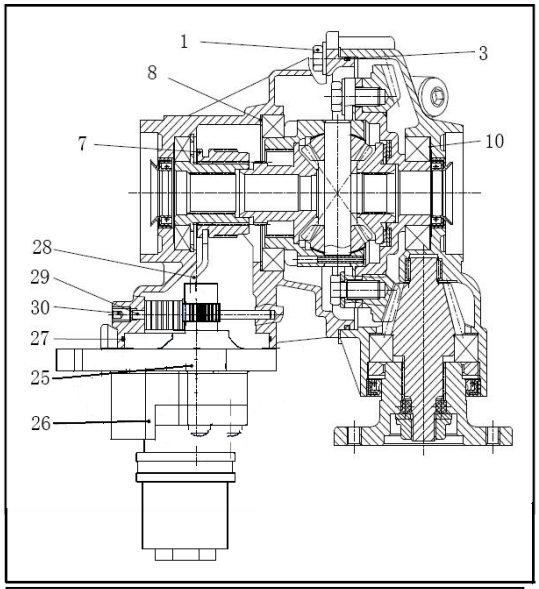
Use proper washer to make gear working freely.



Adjust washer thickness	0.2	0.3	0.4	0.5	1.0

● **Front axle assembly and adjustment**

Illustration:

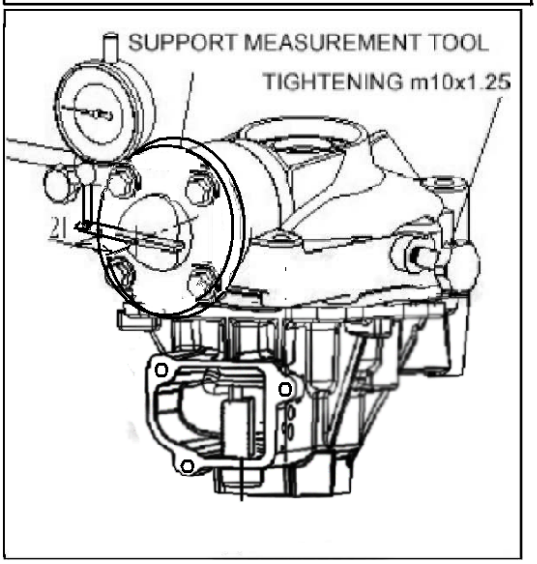


Tightening torque	
Item“ 1”	25Nm
Item“25”	10Nm
Item“30”	13Nm

Use fastening glue for item“30” assembly.

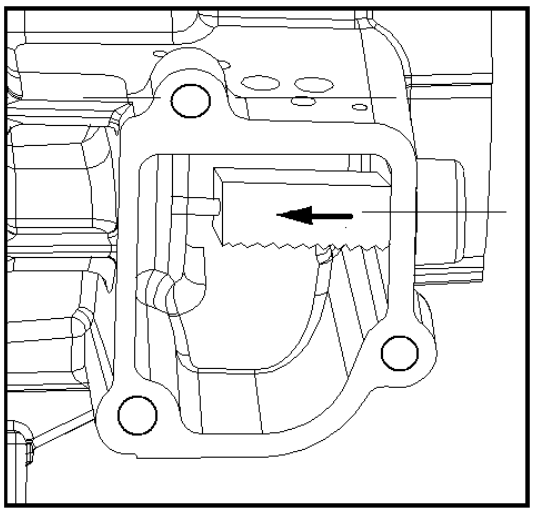
a. Use proper washer 8 and 10 thick ness to adjust gear side clearance between drive pinion gear and differential gear.

Drive bevel gear clearance measurement; Install support tools, tightening bolts(M10 ×1.25) put up dial indicator, make sure 21 mm is between measuring point and support tools. Turn support tools counter-clock and read the data.



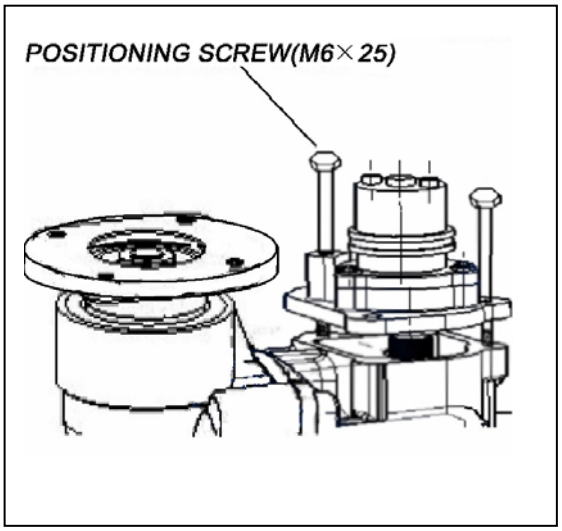
Standard: 0.10-0.25

Adjust washer thickness	0.1 0.2 0.3 0.4 0.5 1.0



b. Shift fork and drive clutch assembly should be against tightly to the arrow shape illustration.

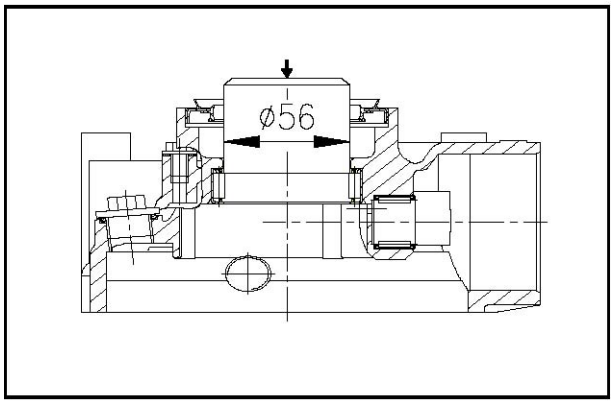
c. Use special equipment or vehicle control circuit into two stroke position(M6×25) before gear motor assembly;



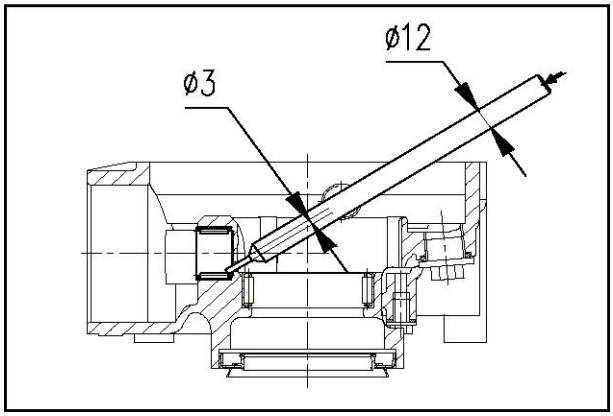
d. Make sure b and c is assembled using illustrated positioning bolt before gear motor and front axle.

Needle bearing removal

a. Disassemble needle bearing 55BTM6820 as illustration if necessary.



b. Disassemble needle bearing NA5903 as illustration after heating up to 150℃ .



Rear axle inspection after disassembly

- Check if there is crack or damage in rear gear case, see mounting hole is ok . Replace gear case or right cover if necessary;
- Check if bearing clearance is normal, and turning stability, rollway, stell ball, neddle bearing as well. Replace bearing if necessary.(Special tools are required)
- Check rear axle if bearing clearance is normal, turning status rollway, stell ball, neddle bearing as well. Replace bearing if necessary.(Special tools are required)
- Check worn status of drive bevel gear and ring gear rear axle. Replace if necessary;
- Check oil seal lips, o-ring shape. Replace parts if necessary;
- Check cylndrical surface of rear axle and oil seal lips. Replace if necessary;
- Check inner and outsider spline. Replace if necessary;
- Check other parts. Replace if necessary.

Foreword

The 472 engine is a cylinder increase in R & D base 372 engine, to meet the more large capacity and power requirements. On the structure and technical characteristics of the engine, and it is the same as the 372 engine. So, everybody through this repair manual understanding, should be able to quickly grasp the essentials of the 472 engine repair.

In order to help the technical service personnel to understand and familiar with Chery QQ SQR7110 models, has the capability of rapid repair and maintenance, specially written "Chery QQ Technology Service Manual - 472 engine mechanical part".

This manual details the disassembly, inspection, testing and diagnosis technology standard Chery QQ472 engine components or systems. This manual is provided by Chery Engine Co. Ltd.

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This manual interpretation of Chery Motor Sales Company Sales Service Department。

The editor
August 2008
（First edition.）

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Chapter 1 Describes the SIMK-31 engine management system

一、 Overview

The engine management system mainly consists of sensors, microprocessors (ECU), executive device is composed of three parts, the inhalation of air traffic control, fuel injection and ignition advance angle of the engine work.

In the engine electronic control system, sensor as input part, for a variety of physical measurements (temperature, pressure), and turn it into a corresponding electrical signal; the role of ECU is to accept input signal sensor, processing and calculation according to the program, to generate a control signal output corresponding to the power drive circuit, power driving circuit is driven by the actuator perform different actions, make the engine run in accordance with the established control strategy; at the same time, fault diagnosis system of ECU for each component or control functions of the system for monitoring, once detected faults and confirmation, the memory fault code, call "limp home" function, when the detected fault is eliminate, then normal recovery using.

二、The basic components of electronic control system

The electronic controller (ECU) Injector Crank position sensor
Oil rail Camshaft position sensor Carbon canister control valve
Intake manifold Oxygen sensor Temperature sensor
Three way catalytic converter Inlet pressure / temperature sensor
Ignition coil and the high-voltage wire
Idle speed regulator Oil pump assembly Solar term door position sensor
Solar term door assembly Knock sensor Temperature sensor

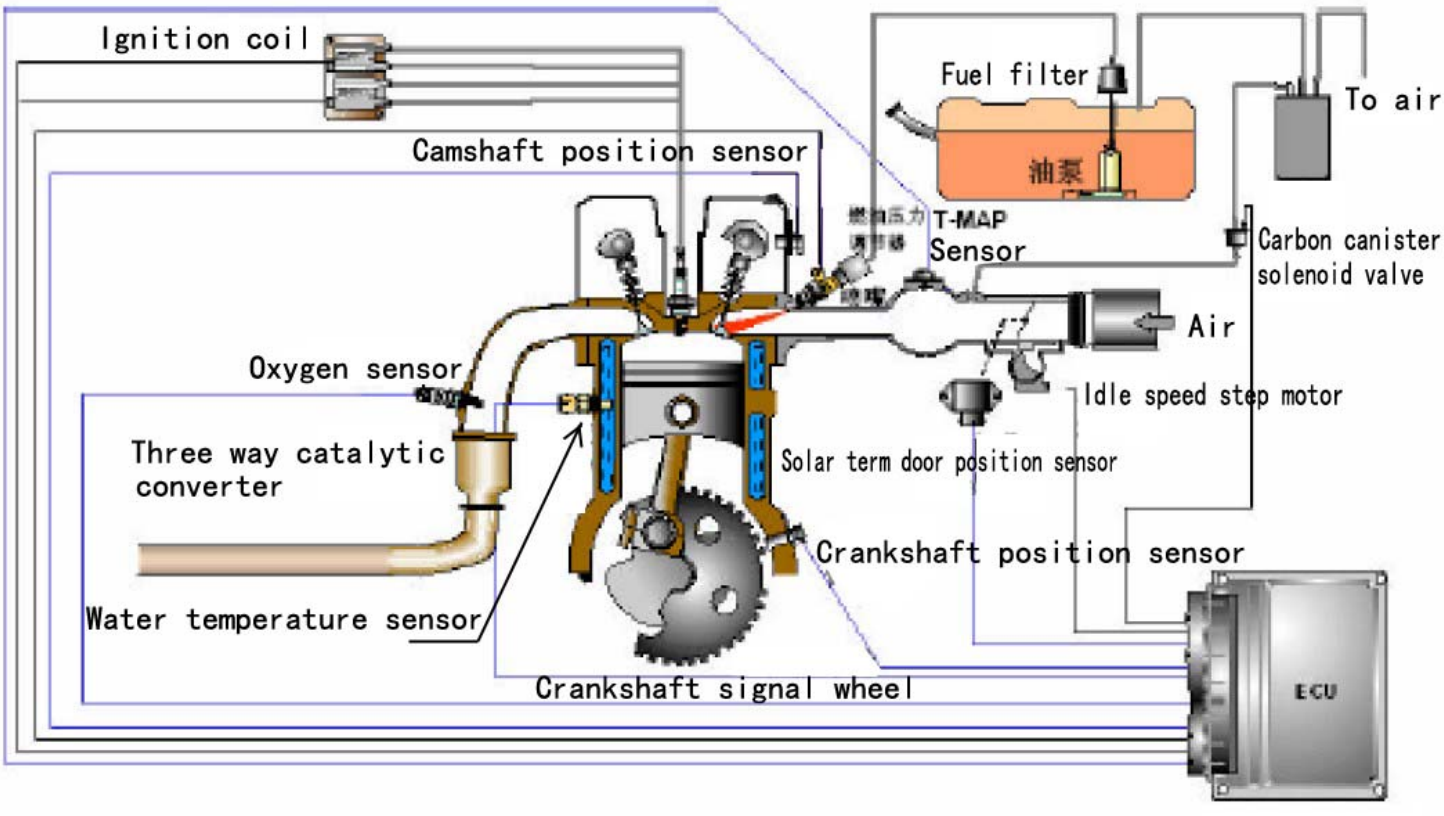
三、The SIMK-31ECU module input and output electrical diagram

1、Input and output module, SIMK-31ECU.

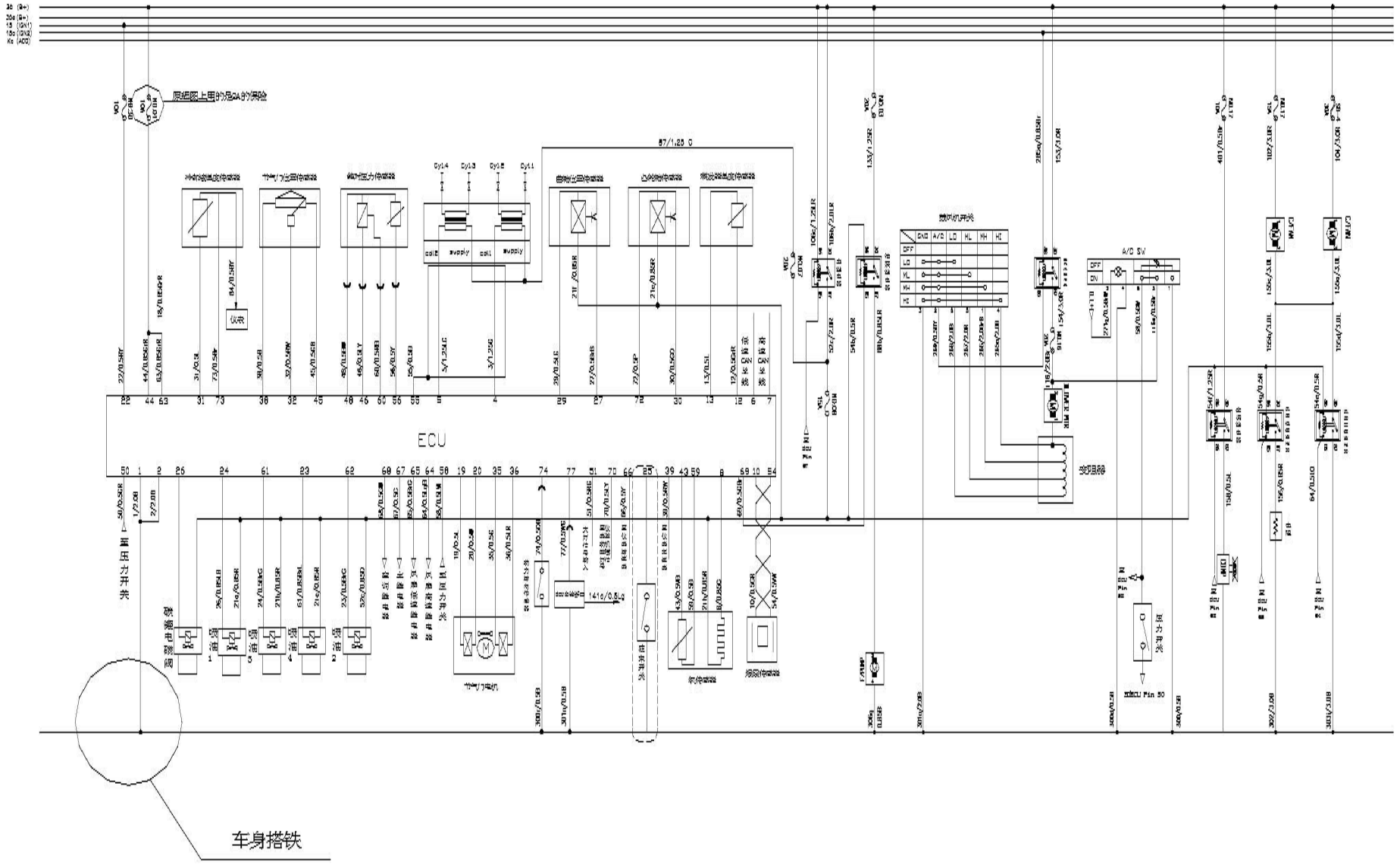
The main sensor input signal in SIMK-31 system of ECU include:
Inlet air pressure signal
Intake air temperature signals
Solar term door position signal
Coolant temperature signal
Crank angle signal
The camshaft phase signal
Oxygen sensor signal
Air conditioning request signal
Air pressure signal
Air conditioner evaporator temperature

Speed signal
Knock signal
The above information into the ECU after the treatment the actuator control signal needed, these signals are driven by amplifying circuit at the output, and transmitted to the corresponding actuator control signal, which includes:
Idle speed regulator opening
Fuel injection timing and injection duration
Ignition coil closed angle and ignition advance angle
The carbon canister control valve opening
Oxygen sensor heater heating control
Main relay
Pump relay control
The air conditioning compressor control relay
Air conditioning cooling fan relay control
Cooling fan relay
Trouble light control

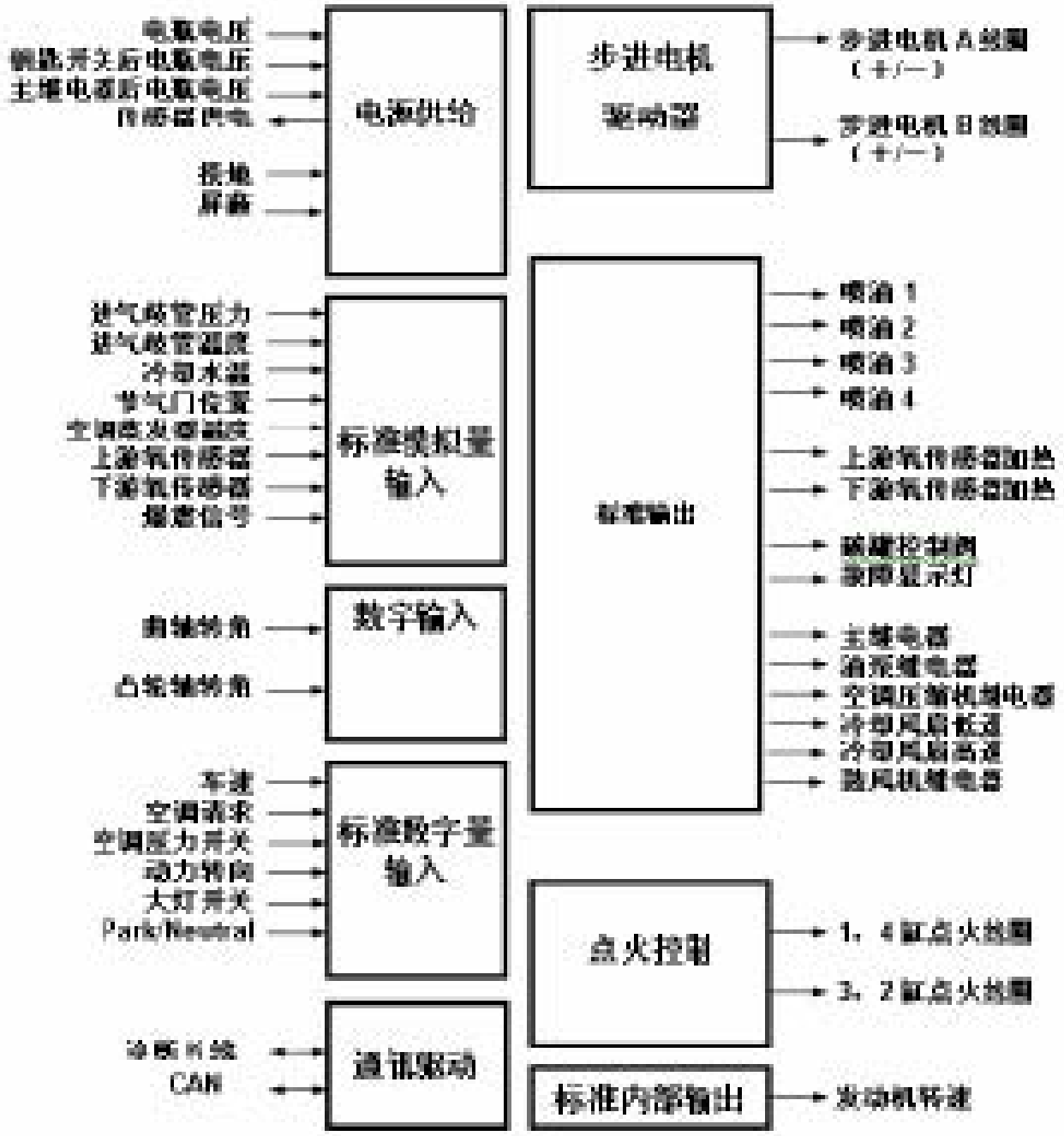
2、The engine management system management system diagram



3、The ECU control principle diagram



4、 The ECU function module layout.



5、Pin output definition ECU

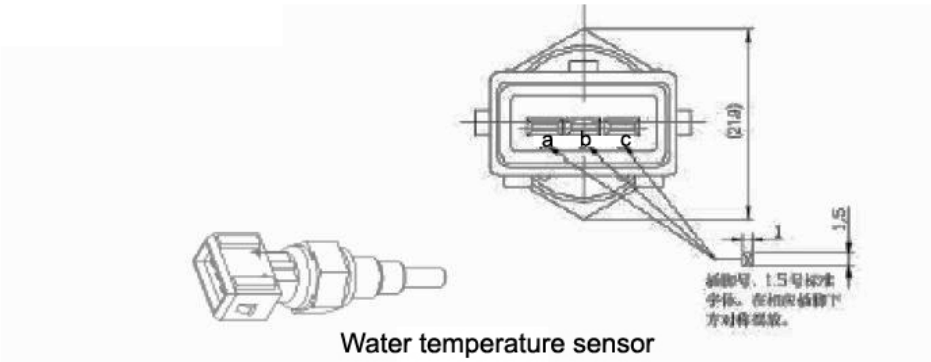
Pin	Connection point / description	Type	Pin	Connection point / description	Type
1	The power of 1	Earth	42	Oxygen sensors downstream signal	Input
2	The power of 2	Earth	43	Upstream oxygen sensor signal	Input
3	Empty		44	Battery power supply 1	Input
4	Ignition signal 1	Output	45	Solar term door position sensor supply	Input
5	Ignition signal 2	Output	46	The intake pressure sensor supply	Input
6	CAN low	Input / output	47	Empty	
7	CAN high	Input / output	48	Inlet pressure and temperature sensor.	Earth
8	Upstream oxygen sensor heater	Output	49	Empty	
9	The lower the oxygen sensor heater	Output	50	Air pressure switch signal	Input
10	Knock signal	Input	51	The headlight switch	Input
11	Empty		52	Empty	
12	The evaporator temperature signal	Input	53	Empty	
13	The evaporator temperature signal	Earth	54	Knock sensor	Earth
14	Empty		55	Ignition shielding.	Earth
15	Empty		56	Intake air temperature signals	Input
16	Empty		57	Empty	
17	Empty		58	Air conditioning request signal	Input
18	Empty		59	Upstream oxygen sensor	Earth
19	Stepper motor coil A+	Output	60	Inlet air pressure signal	Input
20	Stepper motor coil A-	Output	61	2 cylinder injection signal	Output
21	The main relay power	Input	62	4 cylinder injection signal	Output
22	After the ignition is switched power supply	Input	63	Battery power supply 2	Input
23	The 3 cylinder output	Output	64	Cooling fan relay (high speed)	Output
24	The 1 cylinder output	Output	65	Cooling fan relay(low speed)	
25	Empty		66	Engine speed signal output	Output
26	The carbon canister control valve control signal	Output	67	Main relay	Output
27	Crankshaft signal	Earth	68	The air conditioning compressor relay	Output
28	Empty		69	Fuel pump relay	Output
29	Crankshaft signal input	Input	70	Fault indicator	Output
30	Camshaft signal	Earth	71	Empty	
31	The cooling water temperature signal	Input	72	The camshaft position signal	Input
32	Solar term door position signal	Input	73	Coolant temperature sensor	Earth
33	Empty		74	Power steering signal	Earth
34	Empty		75	Empty	
35	Stepper motor coil B+	Output	76	Empty	
36	Stepper motor coil B-	Output	77	Diagnosis of the K	Input / output
37	The lower the oxygen sensor signal	Earth	78	Empty	
38	Solar term door position signal	Earth	79	Empty	

39	The speed signal input	Input	80	Empty	
40	Empty		81	Empty	
41	Empty				

Chapter 2 The working principle of engine management system components

1、Water temperature sensor

1) Diagram and pin



Water temperature sensor	a	signal	ECU X1-31	TCO
	b	signal	To meter	---
	c	earth	ECU X1-73	TCO_GND

2) Installation po

Installed in the cooling water flow rate is high, and can correctly reflect the engine cooling water temperature, such as the water outlet of the engine or the engine cooling system circuit.

3) Working principle

The two NTC thermistor is encapsulated in the temperature sensor, the resistance value varies with the temperature of the cooling water, cooling water temperature is low, the resistance of the thermistor is large. The cooling water temperature is high, the resistance of the thermistor is smaller. Conversion of resistance into the change of voltage input to the ECU, ECU according to the temperature of cooling water, the basic injection time, carries on the revision to the idle speed and the air volume. On the other hand, it also output signals to the instrument, the driving staff can directly by visually judge the operating state of engine.

As shown in Figure 6 structure temperature sensor

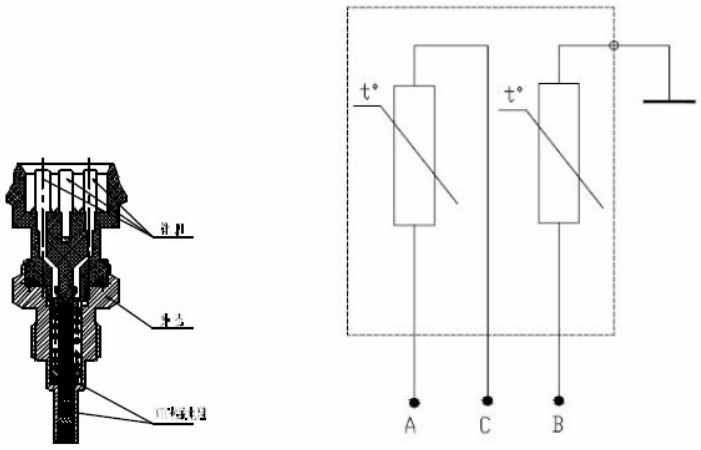


图 6

4) Technical parameters

The water temperature sensor contains two thermistor, a dedicated water temperature signal input pin ECU, use A, C, a water temperature sensor and instrumentation for temperature signal input pin, used for B and shell as earth.

Limit data

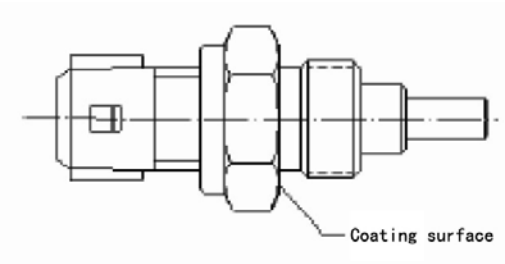
measure	A, C value	B, value	unit
Rated voltage	Run with ECU (5V)		
Nominal resistance at 25 ℃	1.825 to 2.155		KΩ
Operating temperature range	-30 至+130		℃
The maximum current sensor	1		mA
Vibration acceleration license	600		m/s

(2) Characteristic data

number					Temperature (c)
	A, C end temperature tolerance of ± 0.1 ℃ (resistance (Ω))		B junction temperature tolerance of ± 0.1 ℃ (resistance (Ω))		
	Least	The maximum	Least	The maximum	
1	13.71	16.49			-20
2	1.825	2.155			+25
3	0.303	0.326	63.4	81.4	+80

5) Installation notes

The sensor should apply sealant in the installation process, suggestions on the selection of conductive sealant. Sealant should be applied in the graphic (Figure 7) plane, should ensure that adequate smear that sealant after tightening anhydrous leakage phenomenon; pay attention to installation thread does not allow fluid sealant, to ensure that the assembly and disassembly and good conductivity sensor.



In the installation process of tightening, tighten six angle plane using spanner copper sleeve. May not be a plastic parts are tightened, so as not to damage the product. Maximum tightening torque: 20N.m.

6) the malfunction phenomenon and the judgment method

General failure

1. The starting difficulty

A simple method for testing: (unloading joints) digital multimeter to Ohm, two probes are respectively connected sensor A#, C# pin, 25℃ rated 1.825~2.155K resistors. Measurement can also be used when the simulation method, in particular to the sensor working area and dropped into the boiling water (note the immersion time to fully), observe the change of the sensor resistance, the resistor should decline to 300 Ω (specific value as the temperature of boiling water).

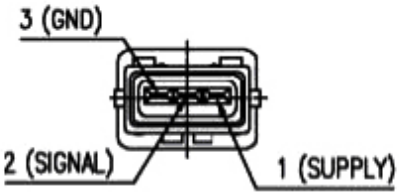
2. The water temperature indicating meter failure

Simple test method:

(unloading joints) digital multimeter to Ohm, two probes are respectively connected sensor B# pin and the copper shell, using the simulation method, in particular to the sensor working area and dropped into the boiling water (note the immersion time to fully), observe the change of the sensor resistance, the resistor should decline to 60 Ω (the specific value as the temperature of boiling water).

2. The crankshaft position sensor

1) Diagram and pin



Crank position sensor	1	Power supply	From the main relay	V_RLY
	2	signal	ECU X1-29	CRK
	3	earth	ECU X1-27	CRK_GND

2) Installation position

The back of the engine flywheel plane.

3) Working principle

Holzer type crankshaft position sensor with the target wheel is matched, provide check point information of engine speed and the cylinder piston. Holzer type crankshaft position sensor integrated dynamic permanent magnet biased differential pair of Holzer IC. When the target wheel in front of regional rotation sensor sensitive IC detection, due to the lack of teeth and tooth alternation is produced by the variation of the magnetic field and the Schmidt trigger conversion by square wave signal.

4) technical parameters

(1) limit data

measure			be worth			units
			Least	Typical	The maximum	
Hall type crankshaft position sensor can withstand temperatures	The launch area		-40		150	℃
	Conductor area		-40		150	℃
	Storage temperature		-40		150	℃
	Don't run when the environment temperature		-40		120	℃
	Long-term environmental temperature during operation		-40		120	℃
	The launch area's entire service life	750 Special Ops			150	℃
		1500 Special Ops			140	℃
		3000 Special Ops			130	℃
	Wire area as a whole lifetime				150	℃
	Insulation resistance (2min test voltage 500VDC)					Mohm
Pressure (60s, 250V)			No breakdown			

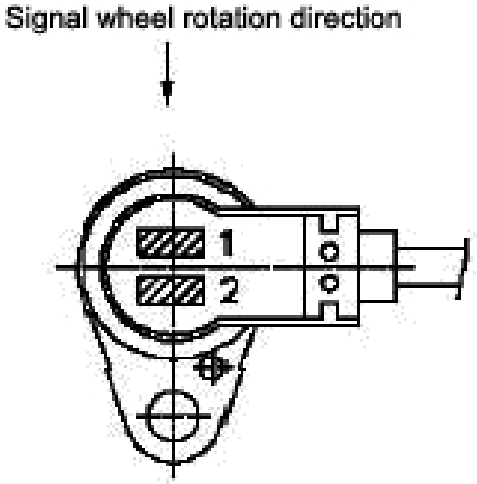
(2) Characteristic data

measure	value		unit
	least	maximum	
The phase accuracy	+0.45	-0.45	。
The air gap	0.3	1.7	mm
The target wheel speed	15	8000	rpm
Supply voltage	6	16	V

5) Installation notes

The sensor is only allowed in the soon to be installed prior to the car or to the test device to remove from packaging materials.

Sensor installation direction specified as shown below.



Installation position of No. 1 and No. 2 Holzer device

Installation method of sensor by indentation instead of hammering. Recommended bolt fixed sensor M6.Tightening torque of 8 2Nm.

Holzer type crankshaft position sensor and signal disc tooth tip of the air gap between nominal value is: 1.0mm; allow the range is 0.3 to 1.7mm.

6) The malfunction phenomenon and the judgment method

Fault phenomenon: not starting.

General failure: man-made fault.

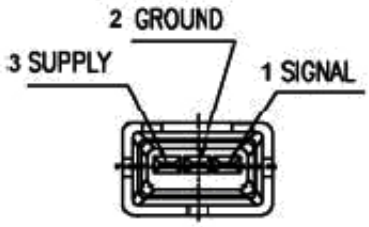
Note: repair installation method of repair process by pressing instead of hammering.

A simple method to measure:

(thenthefragmentswereligatedwithan adapter) open the ignition switch but do not start the engine, the digital multimeter to DC voltage, two probes are respectively connected sensor 1#, 3# pin, to ensure that the reference voltage 12V. Start the engine, the 2# pin signal by the automotive oscilloscope check whether it is normal.

3, The camshaft position sensor

1) Diagram and pin



Camshaft position sensor	1	signal	ECU X1-72	CAM
	2	earth	ECU X1-30	CAM_GND
	3	Power supply	From the main relay power supply	V_RLY

2) Installation position

Camshaft end cover.

3) Working principle

The sensor makes use of the magnetic induction intensity changes by Holzer Holzer in the principle of voltage made into.

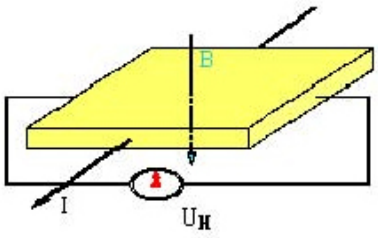
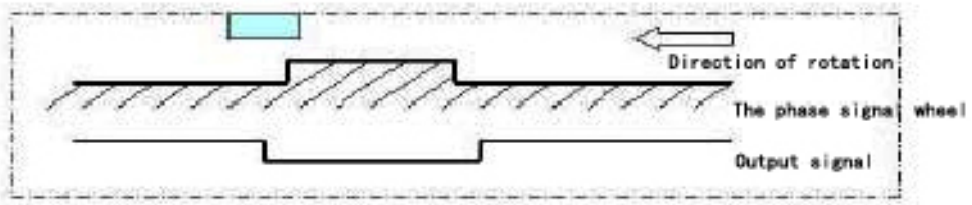
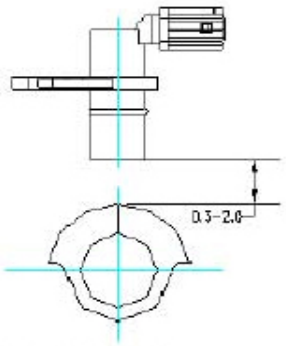


Fig. principle of Holzer effect

When a current of I through the semiconductor chip, a Holzer voltage Uh and the value of magnetic induction B in the right direction of current will (and current I vertical) and current is proportional to I. Effect of magnetic induction intensity change by Holzer E voltage.



Schematic diagram of Holzer elements(1)



Schematic diagram of Holzer elements (2)

4) Technical parameters

Limit data

measure			Value			unit
			Least	Typical	The maximum	
The sensor can withstand temperature	Storage temperature		-40		+150	℃
	Don't run when the environment temperature		-40		+120	℃
	Long-term environmental temperature during operation		-40		+120	℃
	The whole lifetime	200hour	-40		℃	℃
		1000hour			+140	℃
		20X0.5hour			155	℃
Insulation resistance (2min test voltage 500VDC)			15			Mohn

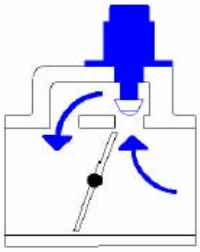
（2）Characteristic data

measure	value		unit
	least	maximum	
Ambient temperature	-30	+120	℃
Install air gap	0.3	2	mm
Supply voltage	4.5	24	V
Relative accuracy	6	6	
The target wheel speed	0	4000	rpm

5) Installation notes

Installation method of sensor by indentation instead of hammering.
Recommended bolt fixed sensor M8. Tightening torque 10~14Nm.
The air gap between the camshaft position sensor and signal wheel: allows the range is 0.3 to 2.0mm; the Holzer elements working diagram (two).
6) fault phenomenon and judgment method
Fault phenomenon: emissions exceed the standard, increased fuel consumption.
General failure: man-made fault.
A simple method to measure:
(thenthefragmentswereligatedwithan adapter) open the ignition switch but do not start the engine, the digital multimeter to DC voltage, two probes are respectively connected sensor 3#, 2# pin, to ensure that the reference voltage 12V. Start the engine, the 1# pin signal by the automotive oscilloscope check whether it is normal.

4. The throttle body



Throttle valve control intake air into the engine cylinder, so as to control the engine speed and load. The festival Flow valve is composed of two channels, namely a main channel and side channel. Solar term door pedal through the throttle cable control main channel opening, gas flow throttling into a cylinder of the engine; solar term door opening by the solar term door position sensor is transmitted to the engine control unit ECU.

Installation notes

(1) the throttle body and the intake hose connection must be sealed, to prevent dust entering the throttle body blocked the inlet channel.

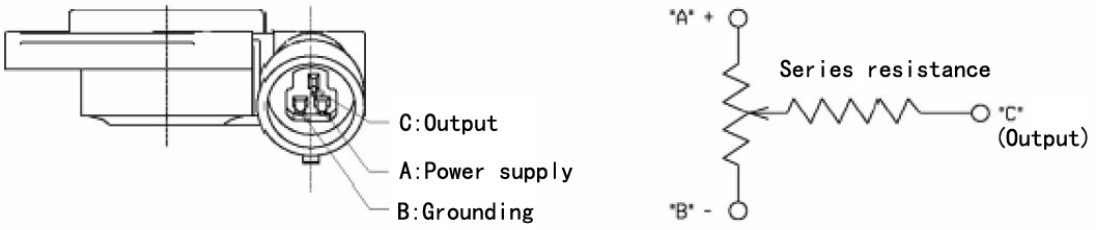
(2) the throttle body and the intake manifold must seal pad, and fastening and loosening leakage. Every time after disassembling the throttle body, need to replace the gasket new.

(3) coloring screw throttle body from the demolition, to prevent the destruction of the initial setting.

(4) the vehicles running on certain mileage, such as twenty thousand kilometers (the large dust, reduce it) or solar term valve plate dust deposition is large, the throttle valve of main channel and side channel cleaning, cleaning agent is not conductive to the throttle body is cleaned, dried, check with a multimeter solar term door position sensor and idle speed step motor is correct, can be loaded back.

5, solar term door position sensor

1) Diagram and pin



Solar term door position sensor	A	Power supply	ECU X1-45	TPS_VCC
	B	Earth	ECU X1-38	TCO_GND
	C	Signal	ECU X1-32	TPS

2) Installation position

Solar term door body.

3) Working principle

The sensor has a linear output angle sensor, comprising two arc-shaped sliding contact resistance and the two sliding contact arm. Slide arm shaft with the solar term door is connected on the same axis. With 5V Vcc supply voltage between two ends of A terminal and the B terminal sliding contact resistance. When the throttle valve is rotated, the sliding contact arm rotates, and move in the sliding contact resistance, and the potential of the VP contacts as output voltage derived from

the C terminal. So it is in fact a angular potentiometer, potentiometer output and solar term door position into a voltage signal proportional.

4) Technical parameters

The relationship between data for throttle valve opening and voltage as shown in the following table

Aperture(°)	0	10	20	30	40	50	60	70	80	85（Fully open）
Voltage（V）	0.33	0.78	1.25	1.71	2.17	2.63	3.08	3.52	3.99	4.5

Limit data

measure	value	unit
Mechanical angle between two extreme positions	119	angle
The throttle body electrical angle between two extreme positions	8±2	angle
Slide arm current license	≤18	μA
Storage temperature	-40+130	℃
Vibration acceleration license	≤700	m/s

Characteristic data

measure	value			unit
	least	typical	maximum	
Total resistance (pin A-B)	4.335	5.1	5.865	kΩ
Slider protecting resistor (slider at zero, pin B-C)	710		1380	Ω
Operating temperature	-40		130	℃
The power supply voltage		5		V
The right extreme position of the voltage ratio	0.04		0.093	
The left extreme position of the voltage ratio	0.873		0.960	
VP/Vcc with the throttle angle increase rate	22	0.0009929		1/degree
Weight		25	28	g

5) The malfunction phenomenon and the judgment method

(1) The fault phenomenon: can not enter the idle state; or step on the accelerator, accelerate the powerless;

(2) The cause of failure of internal short circuit or open circuit: sensor; or throttle body to the engine control unit Connection or short circuit breakers.

(3) Note: repair is not removable solar term door position sensor

(4) A simple method to measure

The power supply voltage measurement sensor A and B ends of the 5V;

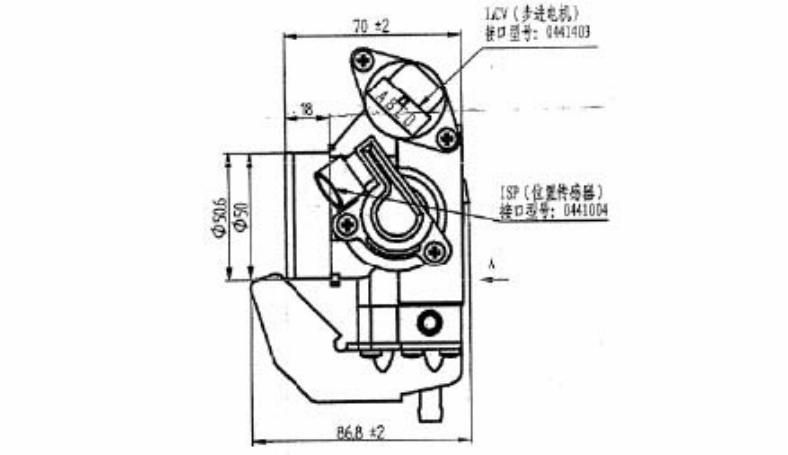
Resistors A and B ends of the value is about

Signal C solar term door idle position of voltage between 0.3~0.7V;

Signal C is fully open when the voltage to ground between 4.05~4.75V.

6. Idle speed control motor

1) Diagram and pin



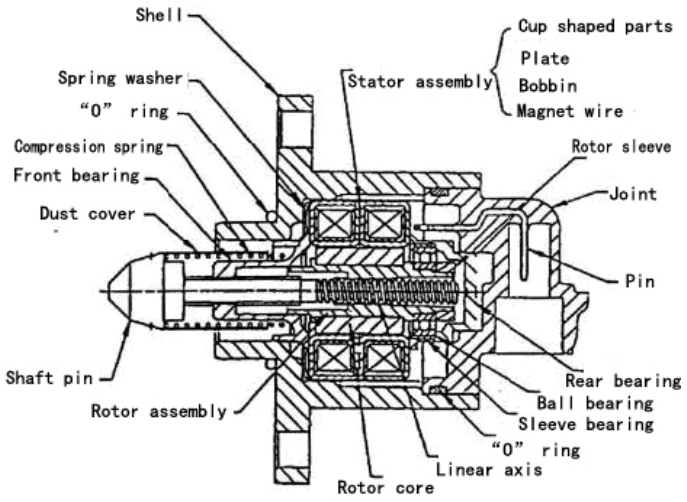
怠速执行器	A	STA+	ECU X1-19	STPA_POS
	D	STA-	ECU X1-20	STPA_NEG
	B	STB+	ECU X1-35	STPB_POS
	C	STB-	ECU X1-36	STPB_NEG

2) installation position

Solar term door body.

3) working principle

Stepper motor is a miniature motor, it is encircled by a ring composed of a plurality of steel stator and a rotor, see fig.. Each steel stator are around a coil; the rotor is a permanent magnet, permanent magnet center is a nut. Stator coil all always electricity. As long as the change of one coil current direction, a point of the rotor is turned. When the stator coil in the right order to change the current direction, forming a rotating magnetic field of the permanent magnet, the rotor rotates in a direction. If the order is reversed the direction of current change over, so the rotating direction of the rotor will be upside down. Connect a wire rod drives the nut of the rotor center. Because the spiral rod is designed into can not rotate, so it can only move in the axial direction, so it is also called linear axis. End wire rod is a plug, plug and therefore can be retracted or extended, cross-sectional area to increase or decrease the idle speed actuator bypass inlet passage, until it blocked. Whenever the current direction change of a coil, rotor around a fixed point of view, called step, a number equal to 360 divided by the stator or coils. The stepping motor rotor step is 15. Accordingly, the screw rod every move distance is fixed. ECU through the frequency control to replace the coil current direction, to control the stepper motor moves, thereby regulating the bypass channel cross-sectional area and flow of air traffic. The air flow in a linear relationship with the step. There is a spring plug the back screw rod end, see below. Can be used in the plug the elongation direction of the force is equal to the stepper motor force and spring force; the retracting direction can use force on the plug is equal to the step force minus the spring force of stepping.



Idle speed actuator stepper motor profile

4) Technical parameters

(1) Limit data

measure	value			unit
	Least	typical	maximum	
Working temperature	-40		+125	℃
Stepper motor plug contact the maximum number of transposon			2.0x10°	time

Characteristic data

	value			unit
	Least	typical	maximum	
Resistance of 20 ℃ each coil	47.7	53	58.3	Ω
Each coil resistance operating temperature range	35（-40℃）		95（+125℃）	Ω
Inductance on 1000Hz 20 ℃ each coil	26.8	33.5	40.2	mH
Normal working voltage	7.5		12	V
May the work voltage	3.5		14	V
Stepper motor rotor length		0.04167		nm
The bypass passage is opened at both ends of the pressure drop		60		kPa
Gas pressure difference caused by the maximum axial force		6.28		N

5) Installation notes

Idle with stepping motor actuator is installed on the solar term door body castings, constitute a bypass channel at both ends of the solar term door.

Bolt installation using two M5 0.8 14.

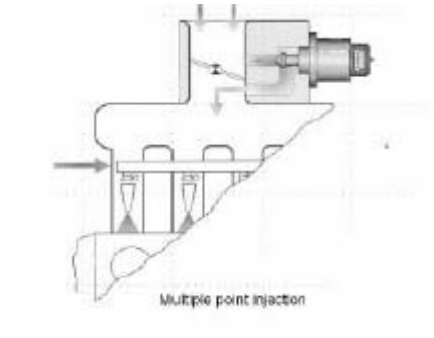
Bolt tightening torque of 4 0.4Nm.

The installation and use of the spring washer, and adhesive.

Idle with stepper motor actuator shaft should not be installed level or lower level, so as to avoid cold Condensate water into.

Shall not be applied in any form of axial force to axial compression into or out of A.

Before the idle with stepper motor actuator into the solar term door body, the shaft must be fully retracted position at.



6) Fault phenomenon and judgment method

Fault phenomenon: idle speed is too high; idling flameout; idle vibration.

Repair the matters needing attention: 1, shall not be applied in any form of axial force to axial compression into or out of a; Before 2, idle speed with stepping motor controller into the solar term door body, the shaft must be fully retracted position at; 3, pay attention to the bypass air drain cleaning and maintenance; 4, remove the battery or ECU, pay attention to timely to the stepper motor reset.

A system reset method is: open the ignition switch but not immediately start the engine, wait 20 seconds, and then start the engine. If at this time that the engine idling bad, must repeat the above steps.

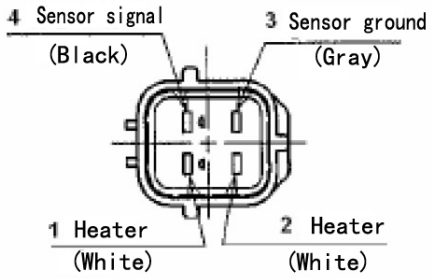
A simple method to measure: (unloading joints) digital multimeter to Ohm, two probes are respectively connected regulator AD, BC pin, 20 ℃ rated resistance was 53 ± 5.3Ω.

7. Heated oxygen sensor

1) Structure diagram and pin

Upstream heated oxygen sensor	1	Heater pin A	From the main relay power supply	V_RLY
	2	Heater pin B	ECU X1-8	LSH_UP_1PWM
	3	Earth	ECU X1-59	VLS_UP_1_B
	4	Signal	ECU X1-43	VLS_UP_1_A

Downstream heated oxygen sensor	1	Heater pin A	From the main relay power supply	V_RLY
	2	Heater pin B	ECU X1-9	LSH_DOWN_1PWM
	3	Earth	ECU X1-37	VLS_DOWN_1_B
	4	Signal	ECU X1-42	VLS_DOWN_1_A



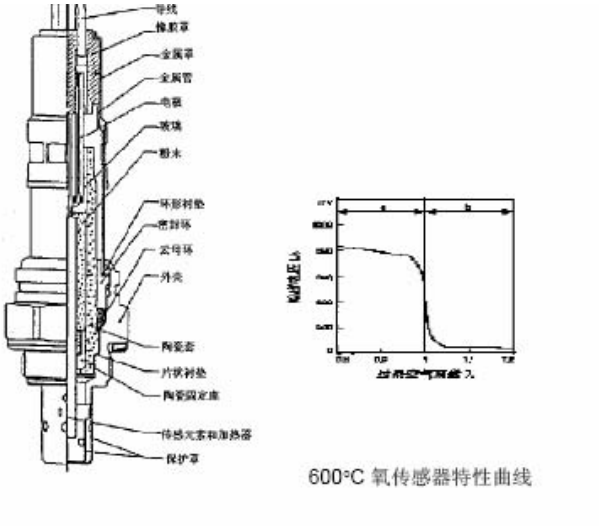
2) Installation position

Exhaust manifold tail, before the three way catalytic converter

3) Working principle

The sensing element of the oxygen sensor is a kind of porous ceramic tube, tube wall is surrounded outside of engine exhaust, the inside atmosphere. Sensing the ceramic tube wall is a kind of solid electrolyte, with electric heating elements, see picture.

The oxygen sensor is the oxygen ion concentration sensing ceramic tube inside and outside the difference into voltage signal output implementation. When the sensing ceramic tube temperature reaches 350 ℃, which has the characteristics of solid electrolyte. Because of its special material, the oxygen ions can freely through the ceramic tube. It is the characteristic, the concentration difference into potential difference, thus forming electrical signal output. If the gas mixture of concentrated. The ceramic tube and oxygen ion concentration is high, the high potential difference, oxygen ions from the medial to lateral, the higher output voltage (close to 800mV~1000mV); if the original lean mixture, the ceramic tube and oxygen ion concentration is low, the potential difference is low, only a small amount of oxygen ions from the medial to lateral, the output voltage is low (close to 100mV~200mV). Signal voltage in the theory of equivalent air-fuel ratio (λ =1) occurred near mutation, see below.



4) Technical parameters

Limit data

measure		value			unit
		Least	typical	maximum	
Working temperature	Storage temperature	-40		+100	℃
	Ceramic pipe	350		900	℃
	Case six hexagon nuts	-40		600	℃
	Cable metal buckles and connecting cable	-40		210	℃
	Connector plug			≤120	℃
The maximum allowable temperature of the heating element on the (each factory 10 minutes, a total of up to 40 hours)	Ceramic tube short exhaust			950	℃
	Case six hexagon nuts			650	℃
	Cable metal buckles and connecting cable			250	℃/s
Rate of temperature change of ceramic tube end license				100	℃/s
The rate of change of the six hexagon nut shell.				150	℃
Housing permits	70~300 Hz			30	g
Connect the DC current at 350 ℃				±10	μA
Exhaust temperature is 350 ℃, the maximum connection AC current				±10	μA
Fuel additives permit		Unleaded gasoline, pay allows lead up to 13mg/L.			
The oil consumption and oil combustion		Allowed values and data required by the customer through the determination of appropriate scale, test guideline values: ≤ 0.25L/1000Km			

（2）Characteristic data

measure	new		250 hours after the bench test	
Exhaust temperature characteristics of data set	350℃	850℃	350℃	850℃
Mixed gas concentration sensor voltage (Mv)	750~920	710±70	840±80	710±70
Mixed gas concentration sensor voltage (Mv)	40~100	55±30	20±50	40±40
The sensing element resistance (Km)	1~5	≤0.1	≤1.5	≤0.3
Response time (Ma) (600mA to 300mA)	100~300	＜200	＜400	＜400
Response time (Ma) (600mA to 300mA)	60~250	＜200	＜400	＜400

（3）Sensor data

measure		value	unit
The new sensor with the insulation resistance between element and the sensor joint	At room temperature, the heating element (500V DC)	≥1	MΩ
	Exhaust temperature 350℃	≥10	MΩ
	Exhaust temperature 850℃	≥100	KΩ
The power supply voltage on the plug	Rated voltage	12	V
	Working voltage	12 至 14	V
	Working voltage up to 1% of the total life can be maintained, the exhaust temperature ≤ 350 ℃	15	V
	To maintain the working voltage of up to 75 seconds (exhaust temperature ≤ 350 ℃)	24	V
	The test voltage	13	V
The working voltage is 13V, the heating current at thermal equilibrium (exhaust temperature is 35 ℃, the exhaust velocity of about 0.7M/s)		12	W

The working voltage is 15V, the heating current thermal equilibrium (350 ℃, the exhaust of greenhouse gas flow velocity of about 0.7m/s)	5	A
Fuse filament heating circuit	8	A

(4) The use of life

Oxygen sensor life associated with gasoline lead content, see the following table.

Gasoline lead content (g/L)	Life (km)
≤0.6	30000
≤0.4	50000
≤0.15	80000
≤ 0.005 (gasoline)	160000

4) Installation notes

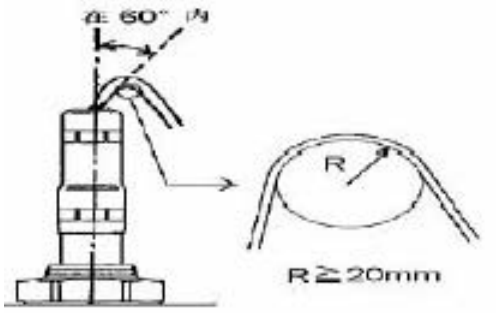
Oxygen sensor should be installed in the exhaust gas mixing place, and when a vehicle moves, air cooling metal shell and wire should be flow.

On the exhaust pipe can ensure the representative of the exhaust components and can meet the requirements of the temperature limit position. Installation location should be as close as possible to the engine. The exhaust pipe should be provided with screw, screw in oxygen sensor used for.

nstall the attitude of oxygen sensor

Oxygen sensor should be installed with the horizontal plane angle is greater than or equal to 45 degrees, and the sensor tip down, to avoid the cold start of condensed water accumulated between the sensor housing and sensing ceramic tube.

Oxygen sensor wire can not bend more than 60 degrees, the bend arc radius is greater than or equal to 20 mm, and the wire should not bear the tensile stress. The following diagram.



The exhaust pipe of the request: to make the exhaust gas oxygen sensor in front region of the tube rapid heating. If possible, the exhaust pipe should be designed to tilt, in order to avoid condensation water together in the front area of the sensor.

Do not use cleaning fluid, oily liquids or volatile solids in the plug of the oxygen sensor.

Cannot use impact wrench fastening sensor.

Thread the oxygen sensor for M18 1.5-6e.

The six angle of the head size of oxygen sensor for 21.67~22.

Tightening torque 34~44Nm oxygen sensor.

5) Fault phenomenon and judgment method

Fault phenomenon: idling bad, bad acceleration, exhaust, fuel consumption is too large, exceed the standard.

Common fault: 1, 2 more than life, engine oil burning, causes the sensor surface area carbon 3, wet water vapor inside the transducer, a temperature change, probe fracture; 2, oxygen sensor "poisoning". (Pb, S,
Br, Si)

Repair note: prohibit the use of cleaning liquid, oily liquids or volatile solids in the oxygen sensor in repair.

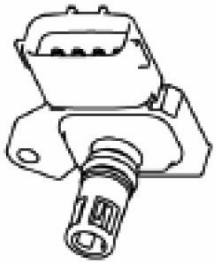
A simple method to measure:

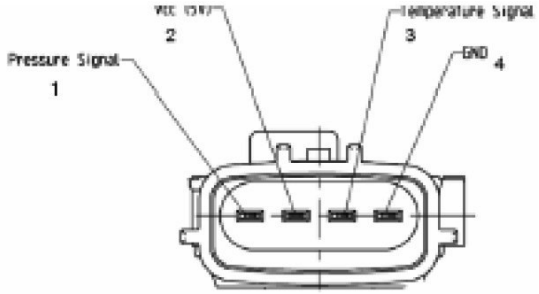
(Remove connector) digital multimeter to Ohm, two probes are respectively connected sensor 1# (white), 2# (white) pin, room temperature (23 ± 5 ℃) under the resistance of 5.4~6.6.

(Connect the connector) under idling state, the oxygen sensor at the working temperature of 350 ℃, the digital multimeter to the DC voltage, two probes are respectively connected sensor 3# (grey), 4# (black) pin, the voltage should be in the rapid fluctuation between 0.1-0.9V.

8. The intake air temperature and absolute pressure sensor

1) Structure diagram and pin





Intake air temperature and absolute pressure sensor	1	Pressure signal	ECU X1-60	MAP
	2	Power supply	ECU X1-46	TMAP_VCC
	3	Temperature signal	ECU X1-56	TIA
	4	Ground	ECU X1-48	TMAP_GND

2) Installation position

The sensor consists of two sensors, intake manifold absolute pressure sensor and the inlet temperature sensor assembly, is installed in the

The intake manifold.

3) Working principle

Intake manifold absolute pressure sensor element consists of a silicon chip. A pressure diaphragm etched on the silicon chip. The pressure diaphragm has 4 piezoelectric resistance, the 4 piezoelectric resistance as the strain components into a Wheatstone bridge. The silicon chip in addition to the pressure diaphragm, also has an integrated signal processing circuit. The silicon chip with a metal shell to form a closed reference space, gas reference space of the absolute pressure is close to zero. Thus forming a microelectronic mechanical system. Active surface silicon chip has a close to zero pressure, its back through the manifold through a pipe into the test tube, the absolute pressure. The silicon chip thickness of only a few microns (m), so the intake manifold absolute pressure change makes silicon chip mechanical deformation, 4 piezoelectric resistance followed by deformation, the resistance value change. By processing the signal processing circuit of silicon chips, forming the linear relationship between the voltage signals and pressure. Intake air temperature sensor element is a negative temperature coefficient (NTC) resistor, the resistance changes with the intake air temperature sensor, the transmission to the controller a voltage representing the intake air temperature change.

3) Technical parameters

(1) Limit data

measure	value			unit
	Least	typical	maximum	
Tolerance power supply voltage for 1 hours			16	V
30 minutes of tolerance pressure			500	kPa
Tolerance Storage Temperature	-40		+130	℃

(2) Characteristic data

measure	value			unit
	Least	typical	maximum	
Pressure test range	10		120	kPa
Operating temperature	-40		1230	℃
Operating supply voltage	4.5	5.0	5.5	V
Current at U=5.5V.			10	mA
Or the load resistance of the battery	50			kΩ
Response time			7	Ms
Weight		27		g

(3) The limit data of temperature sensor

Storage temperature: -40/+130 ℃

(4) Characteristics of the data of temperature sensor

Operating temperature: -40/+130 ℃

Rated voltage: to lead resistance 1KΩ, Operation under 5 V, or to test the current running 1mA 20 ℃ rated resistance: 2500 KΩ.

4) Installation notes

The sensor is designed for installation in the planes of an automobile engine intake manifold. Pressure pipe and temperature sensor together out of the intake manifold, to realize the sealing of the atmosphere with a O ring. If you take the right way to install to the car (extraction pressure, from the intake manifold pressure over sloped down and so on), can not ensure the formation of condensed water pressure sensitive element. Drilling and fixed on the intake manifold must be carried out in accordance with the supply, in order to ensure the long sealing and erosion resistance of medium. Joint reliable electrical connection contact except mainly affected by components of joint, but also with quality and size precision materials joints matched the wire harness. 6 bolt mounting torque is 8~10Nm

5) Fault phenomenon and judgment method

Fault phenomenon: poor idling flameout.

Common fault: 1, using the process of abnormal high pressure or reverse current; 2, the repair process of vacuum element

Damage.

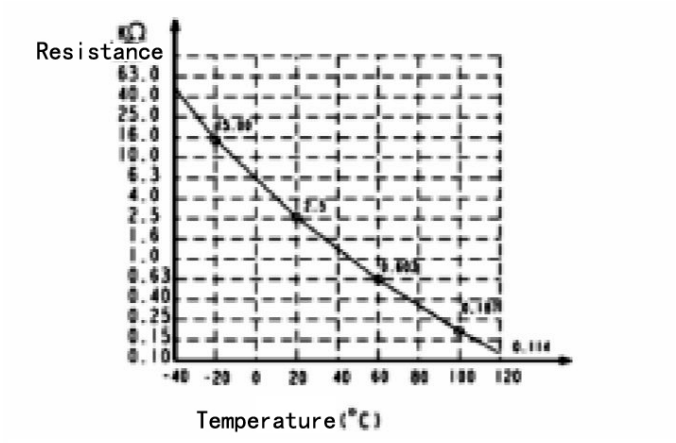
Repair note: impact to the vacuum unit using high pressure gas no repair process; find fault to replace the sensor

The time to check whether the generator output voltage and current of the normal.

A simple method to measure:

Temperature sensor:

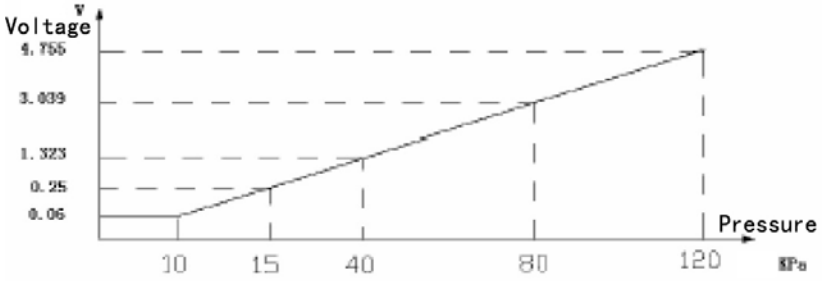
(unloading joints) digital multimeter to Ohm, two probes are respectively connected sensor a#, b# pin, 20 ℃ rated resistance is 2500KΩ, resistance value other corresponding can amount by the above characteristic curve. Measurement can also be used when the simulation method, in particular to send wind direction sensor with a hair dryer (note not reliable too close), observe the change of the sensor resistance, the resistance should be reduced.



Intake air temperature sensor NTC resistance curve

Pressure sensor:

(Connect the connector) The digital multimeter to DC voltage, the black pen grounding, the red pen is respectively connected with the c#, the d# pin. The idle state, the reference voltage c# pin should be 5V, d# pin voltage is about 1.3V (about a specific numerical and models); no load condition, slowly open the solar term door, d# pin voltage change little; solar term door opened quickly, voltage d# pin can instantly reach 4V left and right (specific numerical and vehicle), and then drops to about 1.5V (the specific numerical and vehicle).



Pressure sensor characteristic curve

9. The fuel rail assembly

The fuel rail assembly consists of the fuel distribution pipe (rail), composed of four injector and fixing clip.

1) Installation notes

Pay attention to dust, dust shall not be allowed to enter the pipe or plug injector nozzle;

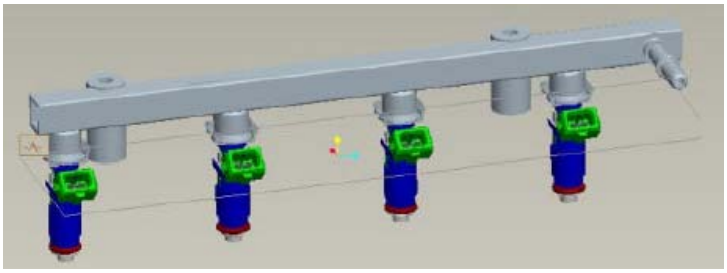
Fuel rail assembly shall not bump, so as to avoid oil leakage accidents;

When installing the fuel injector sealing ring using clean, no silicone oil lubrication;

Oil inlet fuel rail assembly and from the tank pipe connection, should be fastened without leakage.

2) Installation position

The fuel rail assembly.



3) Technical parameters

(1) Limit data

measure	maximum			maximum
	least	typical	maximum	
Continuous work permit temperature	-40		+120	℃
The maximum allowable temperature of fuel			+55	℃
Maximum permissible pressure drift -30 ℃ (reversible)	-2%		5%	
Maximum permissible pressure drift -85 ℃ (reversible)	-5%		+2%	
Maximum peak acceleration			350	m/s
The maximum pressure fluctuation value of import license			100	kPa

(2) Characteristic data

measure	maximum			unit
	least	typical	maximum	
Rated pressure difference flow Q=801//	370	380	390	kPa
Changes in the flow in the 15 to 140 1/h range of the working pressure.			20.5	kPa
Flow range	10		280	L/h
A slope characteristic curve			0.165	kPa/L/h

(3) The requirement of fuel

Fuel pressure regulator can be used to meet the people's Republic of China national standard GB 17930-1999 "unleaded gasoline for vehicle and the" national environmental protection standards GWKB 1-1999 "standard" harmful substance control gasoline regulations fuel.

4) Fault phenomenon and judgment method

Fault phenomenon: low fuel pressure or high, difficult to start.

General failure: due to long-term use: 1. Lack of maintenance, filter plug; 2. Impurity particles caused by large leakage; 3. Man-made mechanical damage etc.

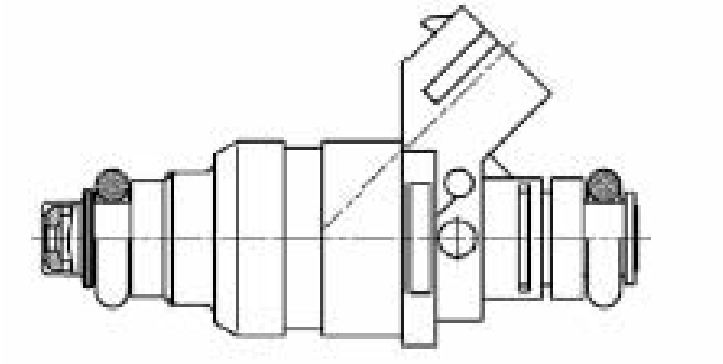
Repair the matters needing attention: 1. No impact of rail by high-pressure gas to oil; 2. A ban on the cleaned with strong corrosive liquid; 3. No external force caused by deformation.

A simple method to measure:

Start the engine into the tubing connected to the fuel gauge,, enable the engine to run at idle speed, check the fuel pressure is about 260kPa; pulling off the fuel pressure regulator vacuum tube on the observation time, the fuel pressure is about 300kPa.

10. The fuel injector

1) Diagram and pin



1 The fuel injectors for cylinders	SM1	Power supply	Main relay	V_RLY
	02	Injection signal	ECU X1-24	IV1
3 The fuel injectors for cylinders	SM1	Power supply	Main relay	V_RLY
	02	Injection signal	ECU X1-61	IV2
4 The fuel injectors for cylinders	SM1	Power supply	Main relay	V_RLY
	02	Injection signal	ECU X1-23	IV3
2 The fuel injectors for cylinders	SM1	Power supply	Main relay	V_RLY
	02	Injection signal	ECU X1-62	IV4

Pin: each injector has two pins SM1 and 02. Among them, the foot with SM1 identifies the main relay
The electrical output of 87 pin; another in accordance with 1, 2, 3, 4 cylinder are respectively connected with the ECU X1-24, X1-62,
X1-61, B60 pin. V1~4 said the first to the fourth fuel injectors.
2) Installation position
One end of the cylinder head intake valve close.
3) Working principle
Injection time of ECU through pulse width to control fuel injector. Current flowing through the injector coil, producing drag needle
The electromagnetic force, when the electromagnetic force increases to a certain extent, the needle was beginning to rise, fuel injection process begins, when the current stops
When the needle valve, under the action of the spring, heavy and closed end, fuel injection process.
4) Technical parameters
(1) Limit data

measure		Value			
		Least	Typical	maximum	unit
Storage temperature (the original packaging)		-30		+70	
Permission temperature fuel injector in a car (not working)		-30		+130	
The working temperature of the fuel injector	Continuous	-30		+120	
	After the hot start (about 5 minutes) time	-30		+130	
The fuel injector inlet fuel temperature	Continuous	-40		+110	
	A short time (about 3 minutes)	-30		+130	
Fuel flow relative to the deviation of 20 ℃ temperature can reach 4%.		＜-40		＞+130	
The -35 to -40 temperature range of 0 - ring leakage license		Allow fuel moisture 0 ring within the region, but shall not divulge			

(2) The allowable fuel
The injector can be used only in accordance with the people's Republic of China national standard GB 17930-1999 "unleaded gasoline for vehicle and the" national environmental protection standards GWKB 1-1999 "standard" harmful substance control of gasoline fuel and provisions, add detergent in gasoline. In particular, gasoline is stored for long time will go bad. In particular, LPG and gasoline dual fuel engine in a taxi, long-term to LPG as fuel, gasoline is used for starting, gasoline consumption rarely. But the long-term operation of fuel pump, fuel tank temperature is high. If gasoline is stored in the car's fuel tank, it is very easy to be oxidized, may cause injector blockage or damage.

Vibration acceleration maximum permissible (peak)			15	G
The power supply voltage	6		16	V
Insulation voltage	10			MΩ
Can afford to not fuel pressure			900	kPa
Capable of bending stress tolerance			6	Nm
Can withstand the axial stress			600	Nm

Characteristic data

measure	Value			unit
	Least	Typical	maximum	
Working pressure (pressure difference)	200	300	400	kPa
Fuel injector resistance at 20 ℃		12		Ω

In particular, gasoline storage for a long time will go bad. In particular, LPG and gasoline dual fuel engine in a taxi, long-term with LPG as fuel, gasoline is used for starting, gasoline consumption rarely. But the fuel pump in long-term operation, oil temperature is high. If gasoline is stored in the fuel tank, it is very easy to be oxidized, may cause the injector blockage or damage.

5) Installation notes

The fuel injector must must use certain plug, not mix.

In order to facilitate the installation, recommended the O ring is connected with the fuel distribution pipes, and clean the oil surface of the lower O ring is connected with the intake manifold mounting hole is coated with no silicon; to clean oil coated with no silicon surface fuel injector and the intake manifold fuel distribution pipe mounting hole. Be careful not to let the oil pollution inside the injector and nozzle.

The fuel injector to be perpendicular to the direction of the oil injector seat into the injector seat, and then use the fuel injector is fixed on the spray clip

Oil filter base. Be careful.

The injector clamp by positioning for axial positioning clamp and axial and radial locating clamp, should avoid misuse.

Fuel injector for the axial positioning of the installation slot, should ensure bayonet clip intermediate completely card into the injector, card slot clamps on both sides of the complete card into the outer edge flanging injector seat.

③ And injector axial and radial positioning requirements should be used for the axial and radial locating clamp and the positioning of injector and fuel injector seat positioning pins are respectively located at the card groove clip in the corresponding installation.

④ If fuel injector with two card slots, care should be taken not to card error, can refer to the original installation position.

Fuel injector installation manual, no knocking injector with a hammer and other tools.

Removing and reinstalling the injector, must replace the O ring. At this time no damage on the sealing surface of fuel injector.

Bearing washer O ring shall be pulled out from the injector. When installation should avoid damage into the oil injector end, O ring, support ring, the orifice plate and the electric plug. If damaged, should be banned.

Install injector fuel distribution pipe assembly tightness detection. No leakage of Fang Wei qualified.

Failure to use manual disassembly. Remove the injector clamp, and then from the injector seat out of fuel injector.

After the demolition should guarantee the injector seat clean, avoid pollution.

6) Fault phenomenon and judgment method

Fault phenomenon: idling bad, bad acceleration, can not start (starting difficulty); or the high fuel consumption, exhaust black smoke.

General failure: due to lack of maintenance, lead to the injector internal glial accumulation and failure, or a cylinder injector does not work; a cylinder injector often injection etc..

Note: repair (see installation notes)

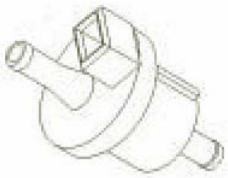
A simple method to measure:

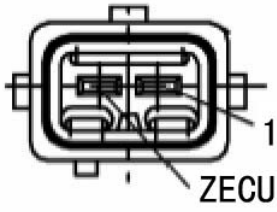
(unloading joints) digital multimeter to Ohm, two probes are respectively connected injector two pin, 20 ℃ rated resistor of 12.

Suggestion: analytical instrument for regular cleaning of fuel injector using special injector cleaning.

11. Carbon canister solenoid valve

1) Diagram and pin





Carbon canister solenoid valve	1	Power supply	Main relay	V_RLY
	2	Pulse signal	ECU X1-26	CPPWM

Pin: the carbon canister control valve has two pins, one by the main relay output pin, another ECU.

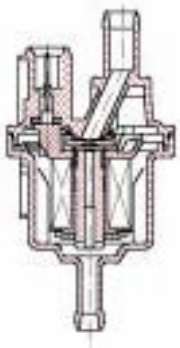
2) Installation position

The vacuum line on the carbon canister and intake manifold.

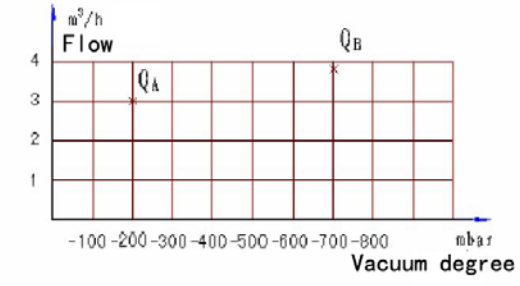
3) Working principle

The carbon canister control valve consists of an electromagnetic coil, armature and valve etc.. Inlet is provided with a filter screen. Through the carbon canister control valve air flow of a connection with the ECU output to the carbon canister control valve electric pulse duty ratio, on the other hand, with the carbon canister control valve between the inlet pressure and the outlet pressure difference. When no electric pulse, the carbon canister control valve closed.

The carbon canister control valve section



In the different pressure difference, the carbon canister control valve in the 100% duty cycle, i.e. all open under the conditions of the flow of each are not identical. Here are two kinds of typical flow curve. Can be seen from the graph, the 700mbar pressure difference, the carbon canister control valve fully open when the flow rate is 3.8m3/h. In the 200mbar pressure difference, the carbon canister control valve fully open when the flow rate is 3.0m3/h.



The carbon canister control valve flow chart

4) Technical parameters

(1) Limit data

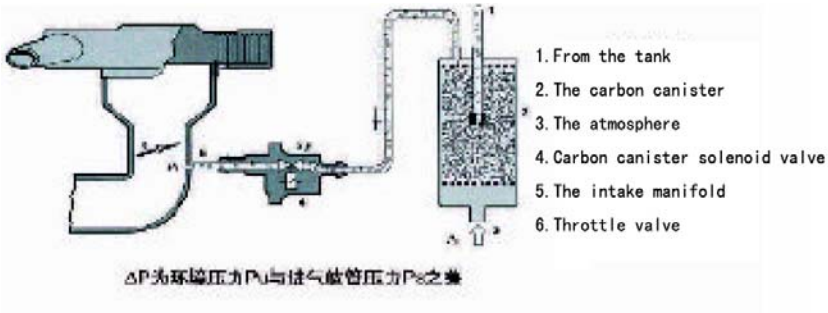
measure	value			unit
	least	typical	maximum	
working voltage	9			V
1 minutes over voltage		22		V
Minimum starting voltage	8			V
The minimum voltage drop	1.0			V
Permission temperature	-30		+120	℃
Working temperature term license			+130	℃
License storage temperature	-40		+90	℃
Can withstand the import and export pressure difference			800	Mbar
Licensing of switching frequency		8X107		
License vibration acceleration product.			300	m/s2
Leakage of pressure difference at 700mbar			0.01	M3/h

(2) Characteristic data

measure		value			unit
		least	typical	maximum	
Rated voltage			13.5		V
+20℃Resistance			26		Ω
Stable voltage wires			0.5		A
The control pulse frequency				30	Hz
Typical control pulse width			10		ms
The differential pressure =200mbar duty ratio 100% of traffic	QA	2.7	3.0	3.3	m/h
The differential pressure =700mbar duty ratio 100% of traffic	QB	3.5	3.8	4.1	m/h

5) Installation notes

The carbon canister control valve and the carbon canister, intake manifold connected to see the installation diagram



The carbon canister control valve installation diagram

In order to transfer to avoid solid sound, recommend the carbon canister control valve installed in the pipe hanging on.

Must be installed with flow direction in accordance with the provisions, the installation direction recommended vertical flip (i.e. the plug downwards vertically).

Must through the appropriate measures such as filtration, purification, to prevent foreign bodies such as particulate matter from the carbon canister or hose into the carbon canister control valve.

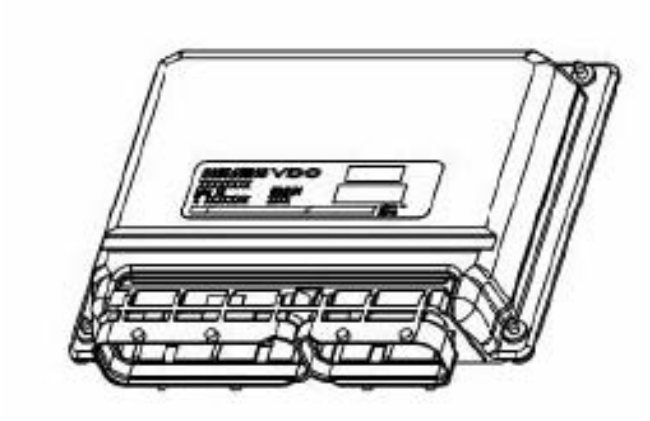
Recommended to install a corresponding protective filter on the carbon canister outlet (mesh size 50 m).

6) Fault phenomenon and judgment method

Fault phenomenon: function failure.

General failure: due to foreign body into the valve, leading to corrosion or poor sealing etc..
Repair note: 1, must be installed with flow direction in accordance with the provisions; 2, when the body as black particles leads to a control valve failure, need to replace the control valve, please check the carbon canister status; 3, repair process to avoid water, oil and other liquid into the valve; 4, in order to avoid solid transfer sound, recommend the carbon canister control valve installed in the pipe hanging on.
A simple method to measure:
(remove electric connector) digital multimeter to Ohm, two one two pin the carbon canister control valve respectively, 20 ℃ rated resistance was 26 ± 3.

12. The engine control unit (ECU)



1) installation position
The cockpit
2) principle of work
Multi-point sequential injection
Ignition control
Idle speed control
Provide power supply of sensor: 5V/100mA
Closed-loop control, adaptive
Control the carbon canister control valve
Air switch
The engine fault indicator
Fuel quantitative correction
The output of the engine speed signal (ESS signal)
The speed signal input
Fault diagnosis
Accept the engine load signal
etc..

3) Technical parameters

Limit data

measure	value			unit
	least	typical	maximum	
The battery voltag	Normal operation	8.0		16.0	V
	Limited function	6.0to8.0		16.0 To 18.0	V
Battery over-voltage tolerance limits and time	16Vto24.2V	Keep part of the function of the engine can be started.		60	S
	0to6V	Storage automatic adaptive value and fault code			
The direction of voltage tolerance					
Working temperature		-40		+85	℃
Storage temperature		-40		+90	℃

4) Note installation of electrostatic protection;

Pay attention to the protection of plug pin, waterproof ring check the wiring harness side within the connector and yellow isolation plate is intact, prevent corrosion caused by poor contact pin.

5) Fault phenomenon and judgment method

Fault phenomenon: unstable idle speed, acceleration, not starting, idle speed is too high, exhaust, exceed the standard starting difficulty, empty

Adjustable injector control failure, failure, flameout.

Common fault: 1, due to the external device electrical overload caused by ECU may lead to the failure of internal parts burned; 2, because ECU water and cause the circuit board corrosion etc..

Note: 1. Repair repair process do not disassemble the ECU; remove the above battery first 5 minutes, remove 2 ECU; 3, after removal of the ECU storage; 4, banned in the ECU online connection with any line.

A simple method to measure:

1. (Connect the connector) Using engine data K line read engine fault recording;
2. (Remove connector) Checking ECU connection line is intact, focus on examination of ECU power supply, grounding line is normal;
3. Check whether the normal work of the sensor, the output signal is credible, the line is intact;
4. Check the actuator is working properly, the circuit is intact;
5. The replacement of the ECU test.

13. Electric fuel pump

1) Installation position

Through the flange bracket is fixed in the tank,

Fuel pump relay	Get an electric shock	SW_A	Battery anode	V_BAT
		SW_B	Fuse pump	---
	Coil	Supply	Main relay power supply	V_RLY
		ON	ECU X1-69	RLY_EFP

Electric fuel pump with two pin, connect the fuel pump relay. Two stitches beside the pump shell engraved with "+" and "-", respectively connected with positive and negative.

2) Working principle

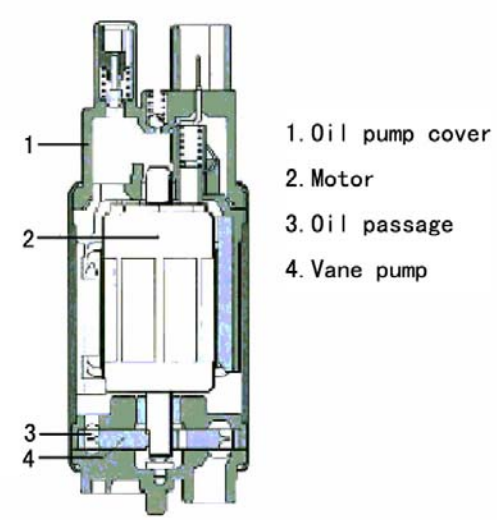
Electric fuel pump is composed of pump and the end of the DC electric motor, a blade cover (integrated check valve, pressure relief valve and the electromagnetic interference element) and other components, see below.

Pump and motor are coaxially arranged, and closed in the same chassis. Around the pump and motor shell are filled

Full of gasoline, the fuel cooling and lubrication. The battery to the electric fuel pump relay power supply, relay

Only when in starting and running of the engine makes the electric fuel pump circuit. When the engine is stopped by accident

When running, automatic stop fuel pump.



Graph: electric fuel pump profile

Electric fuel pump outlet pressure by the pressure relief valve, between 450 and 650kPa. But the pressure in the fuel system from the fuel pressure regulator, 380kPa. According to the need of engine, electric fuel pump can have different flow. For the convenience of production, the same structure of the EKP13 series of electric fuel pump by adjusting step coils adjust the speed of the

motor, thereby adjusting flow. So can not be electric fuel pump for vehicle use another type to.

3) Technical parameters

(1) Limit data

measure	value			unit
	least	typical	maximum	
working voltage	8		14	V（Direct Direct）
system voltage		380		kPa
Output voltage	450		650	kPa
The environment temperature (suitable for storage and transportation)	-40		+80	℃
The license of the fuel temperature	-30		+70	℃
Vibration acceleration license			20	m/s

2) Characteristic data

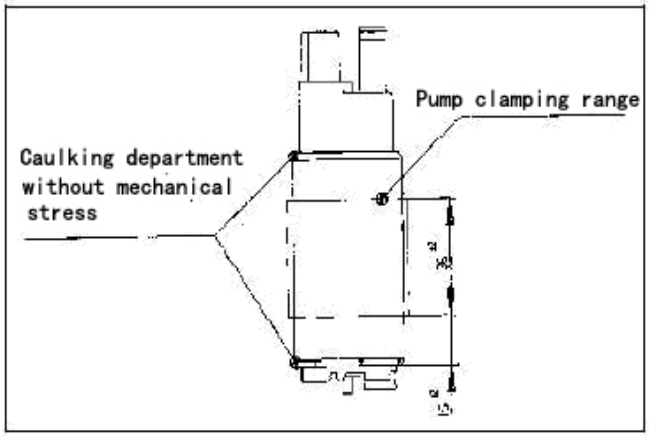
Electric fuel pump in a fuel pressure flow with voltage proportional to. The oil pump using the car plant of each are not identical.

Electric fuel pump capacity is 295-305g.

4) Installation notes

Electric fuel pump should be stored in the original packaging box sealed inside. Mounted on the car after the maximum allowable storage time was 6 months, as accessories maximum storage time for 4 years. Over this time, by the manufacturers to test performance data pump. In the storage place, must be protected against atmospheric effects of oil pump. During the storage period, the original packaging shall not be damaged. Electric fuel pump is applied only to the fuel tank. Install the pump must be installed on the eye size of not more than 60 or agreed with the customer common inlet strainer. Please pay attention not to make the beam injection holes spewing oil into the oil inlet filter, oil pump bracket and the oil tank wall. Be careful when handling pump. First of all, we must protect the oil inlet filter is not affected by the load and impact. Oil pump should be installed to carefully remove from plastic packaging materials. The protective cover only in the pump immediately to install to take. Absolutely not allowed to take into the oil strainer. Foreign body into the oil pump inlet or strainer can lead to pump damage. Install the tubing should pay attention to clean. Tubing must be clean. Please use the new pipe clamp. Please make sure the hose clamp

The correct position, and follow the method recommended by the manufacturer. Not in the tubing or in the inlet filter holding pump at. In order to prevent the pump is damaged, please don't run the pump in the dry state. Do not use damaged pump and once fell to the oil pump on the ground. Oil fell to the ground, to replace the pump tank. Pressure is not allowed in the oil inlet plate. Caulking can not have mechanical stress. Pump clamp must be within the scope of the provisions, see below.



Graph: Pump clamping range

If the pump has been used, please rinse with test solution, and dry in the air. Do not allow the oil pump.

5) Fault phenomenon and judgment method

Fault phenomenon: running noise, poor acceleration, can not start (starting difficulty) etc..

General failure: due to the use of inferior fuel,: 1, glial accumulation formed on the insulating layer; 2. Oil pump bushing and armature lock; 3. oil level sensor assembly corrosion.

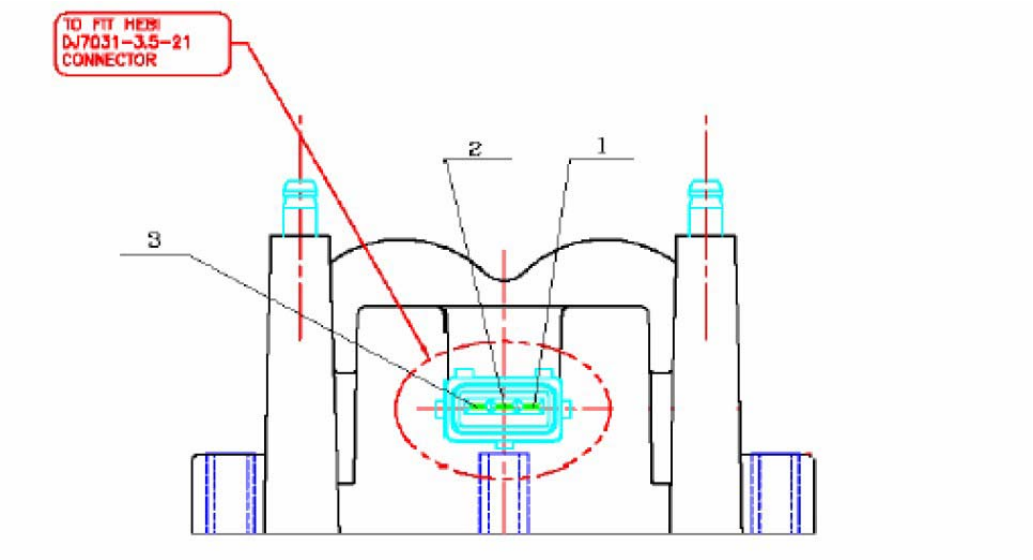
Repair note: 1. according to the need of engine, electric fuel pump can have different flow, fuel pump has the same shape, can hold up is not necessarily appropriate, part No. fuel pump repair by must be with the original agreement, is not allowed to change the wrong; 2. in order to prevent accidental damage to the fuel pump, please don't run in the dry state; 3. the need to replace the fuel pump, please pay attention to the fuel tank and pipeline cleaning and replacing fuel filter.

A simple method to measure:

(Remove connector) Digital multimeter to Ohm, two probes are respectively connected fuel pump two pins, measuring internal resistance, not zero or infinity (i.e. not short circuit, open circuit state).

(Connect the connector) To start the engine into the tubing connected to the fuel gauge, fuel pump, observe whether work; if it is not running, check the "+" pin if there is power supply voltage; if the operation, the idle condition, check the fuel pressure is about 260kPa; off the fuel pressure regulator vacuum tube, whether fuel when the pressure is about 300kPa.

14. The ignition coil



Ignition coil	1	Coil 2	ECU A31	IGC2
	2	Supply	Main relay power supply	V_RLY
	3	Coil 1	ECU A32	IGC1

1) installation position

Installed in the engine compartment

2) working principle

Using double-coil cylinder at the same ignition system

3) technical parameters

Room temperature 23 ℃, typical working voltage of 14V, the primary coil current 7A, secondary output with 50pF load is 38KV - 10%.

4) Installation notes

Requirements for fixed bolt and nut firmly, to prevent loosening caused by vibration, ignition coil, mechanical damage.

5) Fault phenomenon and judgment method

The high-pressure line on the engine pulled out, the spark plug on good, will spark plug metal shell on the engine body, by the spark plug spark ignition coil and the high-voltage wire to judge whether good.

15. Three way catalytic converter

1) Installation position

Welding in the exhaust manifold pipe assembly

2) Working principle

In the three way catalytic converter, CO, HC, NOx respectively, the reduction reaction of oxidation of harmless CO2, H2O and N2, containing precious metal platinum in the carrier (Pe) and (Pd) and rhodium (Rh) of noble metal catalysts. Reaction formula of it as follows: 2CO2NO==2CO2N2 4HC10NO==4CO22H2O5N2. There is a close relationship between the catalyst efficiency height and temperature, the use of harmful components from the exhaust gas temperature to ideal operating condition transformation temperature more than 300 degrees Celsius and the catalytic converter for 400-700 degrees, the maximum allowable temperature is 850-920 degrees Celsius, or noble metal may produce thermal aging, mainly due to activation surface temperature failure and alumina sintering. Catalytic converter conversion efficiency and air-fuel ratio, in the ideal air-fuel ratio (14.7:1) narrow area is (14.5-15.0) catalyst for CO, HC and NOx conversion efficiency reached the highest at the same time. When the air-fuel ratio is too thick, the pollutant conversion Efficiency were decreased, CO and HC is more obvious; while too thin when CO and HC conversion efficiency significantly, NOx was significantly lower.

3) Installation notes

Transport and installation, should be light-light, forbid throwing. If you hear the three way catalytic converter assembly has abnormal noise, possible catalyst carrier rupture, exploratory confirmation. To add high quality gasoline engine failure, to prevent poisoning catalyst, influence the emission.

4) Fault phenomenon and judgment method

If the exhaust pipe assembly has abnormal noise, or the exhaust back pressure is too high, or driving performance variation accelerate the powerless, visually exploration catalyst carrier is melting the blockage, or rupture.

16, The other is connected with ECU signal

Malfunction indicator lampCAN Line for Tool	1	Power supply		V_RLY
	2	Fault display signal	ECU X1_107	MIL
	1	CAN High	ECU X1_17	CAN 1_N
	2	CAN Low	ECU X1_6	CAN 1_L
That engine speed signal of engine tachometer			ECU X1_66	ESS
The speed signal (Holzer)			ECU X1_12	VS
Air conditioner evaporator temperature sensor		Signal A	ECU X1_12	EXAP
		Signal B	ECU X1_13	EVAP_GND

Chapter 3 Introduces the function of fault diagnosis system

The electronic control unit continuously monitoring sensor, actuator, circuit, fault indicating lamp and battery voltage and so on, and the electronic control unit itself, and the actuator driving signal and the internal signal of the sensor output signal, (such as closed loop control, coolant temperature, the idle speed control and battery voltage control) for reliability detection. Once found a link failure, or a signal value is not trusted, the electronic control unit immediately set up fault information recorded in the fault memory in the RAM. Fault recording information stored in the fault code form, has the display order according to the faults.

According to the fault frequency can be divided into "fault" and "breakdown" (such as wire harness circuit transient

Due to poor contact or connector).

1 control, fault lamp

When no fault

★ ignition switch ON, fault light;

★ fault detection speed signal lamp;

When there is a fault

★ ignition switch ON, fault light;

★ starting, find the speed signal out, if the fault lamp fault class is defined as a light mode, then meet the corresponding

Confirmation conditions after the fault light;

To connect 2, diagnostic instrument

This system uses the "K" line of communication protocol, and uses the ISO 9141-2 standard diagnostic connector, see below. The criteria for the diagnosis of joint is fixedly connected on the engine wire harness. With the engine management system EMS is the standard diagnostic connector on the 4, 7 and 16 pin. Criteria for the diagnosis of joint 4 pin connected wire on the vehicle; 7 pins connected to a ECU 77 pin, namely engine data "K" line; 16 pin connected battery.

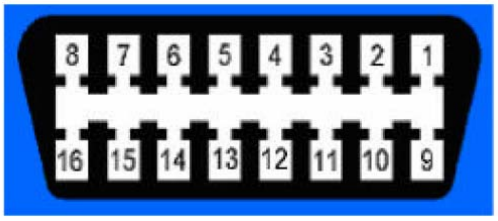


Figure ISO9141-2 Standard diagnostic connector (connected to the engine control unit side)

Connect the diagnosis instrument	4	The body ground	---	GND
	7	Diagnostic instrument signal cable	ECU X1-77	DIAG_K
	16	Power supply	---	V_BAT

Figure ISO9141-2 Standard diagnostic connector (connected to the engine control unit side)

Figure ISO9141-2 standard diagnostic connector (connected to the engine control unit side)

The ECU communicates with external diagnostic device through the "K" line, and can perform the following operations:

(the function and diagnosis instrument operation refer to "diagnostic instrument using the")

1), the engine parameter display

1, rotational speed, coolant temperature, solar term door opening, ignition advance angle, injection pulse width, inlet pressure, inlet temperature, speed, voltage, injection correction, the carbon canister erosion rate, the idle air control, oxygen sensor waveform;

2. The target speed, engine load, ambient temperature, relative ignition dwell time, the evaporator temperature, gas flow rate, fuel consumption;

3. Solar term door position sensor signal voltage, coolant temperature sensor signal voltage, the intake air temperature sensor signal voltage, the intake pressure sensor signal voltage.

2) EFI system status display

Anti-theft system state, safety state, program state, cooling system condition, stable condition, dynamic condition, emission control state, the status of the oxygen sensor, the idle state, the malfunction indicator lamp status, emergency condition, air conditioning system, automatic transmission / torque request status.

3) Actuator test function

Fault lamp, fuel pump, air conditioning, fan relay, ignition, fuel injection (single-cylinder oil).

4) Odometer display

The running mileage, the running time.

5) Version information display

Frame number (VIN), ECU hardware number, ECU number.

6) Fault display

The intake pressure sensor, intake temperature sensor, engine coolant temperature sensor, solar term door position, sensor, oxygen sensor, oxygen sensor heater circuit, air-fuel ratio correction, each cylinder injector, fuel pump, speed sensor, phase sensor, the carbon canister control valve, cooling fan relay, vehicle speed signal, the idle speed, idle speed adjustment device, system voltage, ECU, air conditioning compressor, evaporator temperature sensor, relay fault lamp.

3. The fault code list

number	failure	code
1	P0031	Oxygen sensor 1 heater control circuit shorted to ground
2	P0032	Oxygen sensor 1 heater control circuit shorted for the power supply circuit
3	P0037	Oxygen sensor 2 heater control circuit shorted to ground
4	P0038	Oxygen sensor 2 heater control circuit shorted for the power supply circuit
5	P0107	Manifold pressure sensor circuit shorted to ground
6	P0108	Manifold pressure sensor circuit shorted for the power supply circuit
7	P0112	Intake air temperature sensor circuit shorted to ground
8	P0113	Intake air temperature sensor circuit shorted for the power supply circuit
9	P0116	Coolant temperature sensor circuit scope / nature of the error
10	P0117	Coolant temperature sensor circuit shorted to ground
11	P0118	Coolant temperature sensor circuit shorted for the power supply circuit
12	P0119	Coolant temperature sensor circuit intermittent
13	P0122	Solar term door position sensor for short circuit to ground
14	P0123	Solar term door position sensor for short circuit of power supply
15	P0130	Oxygen sensor 1 circuit fault
16	P0131	Oxygen sensor 1 circuit output voltage is too low
17	P0132	Oxygen sensor 1 circuit output voltage is too high
18	P0134	Oxygen sensor 1 is not activated
19	P0136	Oxygen sensor 2 circuit fault

20	P0137	Oxygen sensor 2 circuit output voltage is too low
21	P0138	Oxygen sensor 2 circuit output voltage is too high
22	P0140	Oxygen sensor 2 is not activated
23	P0230	Circuit pump failure
24	P0261	One cylinder injector circuit shorted to ground
25	P0262	One cylinder injector circuit shorted for the power supply circuit
26	P0264	Two cylinder injector circuit shorted to ground
27	P0265	Two cylinder injector circuit shorted for the power supply circuit
28	P0267	Three cylinder injector circuit shorted to ground
29	P0268	Three cylinder injector circuit shorted for the power supply circuit
30	P0270	Four cylinder injector circuit shorted to ground
31	P0271	Four cylinder injector circuit short for the power supply circuit
32	P0325	Knock sensor circuit failure
33	P0335	Crankshaft position sensor circuit failure
34	P0340	Camshaft position sensor fault
35	P0351	One cylinder ignition coil circuit fault
36	P0352	Two cylinder ignition coil circuit fault
37	P0353	Three cylinder ignition coil circuit fault
38	P0354	Four cylinder ignition coil circuit fault
39	P0444	The carbon canister control valve circuit open
40	P0445	The carbon canister control valve circuit shorted
41	P0501	Speed sensor is not working properly
42	P0505	Idle stepper motor fault
43	P0560	The system voltage fault
44	P0605	ECU (read-only memory) fault
45	P0650	Malfunction indicator lamp control circuit fault
46	P1166	Oxygen sensor controller adaptive fault diagnosis
47	P1502	Wheel speed sensor circuit open
48	P1535	Air conditioning evaporator temperature sensor for short circuit or open circuit power supply
49	P1536	Short circuit of the air conditioning evaporator temperature sensor circuit
50	P1545	High voltage switch or air conditioning clutch relay line fault
51	P1624	Cooling fan relay line fault – low speed
52	P1625	Cooling fan relay line fault - high speed

4. Clear fault codes

The use of diagnostic instrument

1) Turn off the ignition switch.

2) By reading the fault code the same method, the diagnosis instrument to diagnose interface.

3) Connected to the ignition switch.

4) According to the diagnostic tester instructions clear fault code.

5) To complete the fault code is cleared, exit diagnosis procedure, switch off the ignition and remove the diagnosis instrument from the diagnostic interface.

Do not use diagnosis instrument and computer

1) Turn off the ignition switch.

2) Disconnect battery cathode line for more than 30 seconds, then go on.

Note: the fault does not exclude, fault codes will reappear

Chapter 4 Troubleshooting diagnostic process

1. Fault diagnosis based on the fault code description

1. Has been recognized as a steady-state current failure to the following maintenance, otherwise it will lead to wrong diagnosis.
2. The below mentioned "multimeter occasion" refers to the digital multimeter, prohibit the use of pointer multimeter to check on line electronic fuel injection system.
3. Maintenance of the vehicle anti-theft system, if the replacement ECU occasions appeared in the "Next step" bar, pay attention to after the replacement of programming on ECU.
4. If fault code for a circuit voltage is too low, refers to the circuit may be shorted to ground; if the fault code for a circuit voltage is too high, refers to the circuit has the potential to supply short circuit; if the fault code for a circuit fault, refers to the circuit breaker may exist in or there are a variety of line fault.

Diagnostic aid:

1. The fault code cannot clear, failure is a fault; if the breakdown of key check whether there is loose in the wire harness connector.
2. According to the steps examination, no abnormal situation;
3. The maintenance process don't ignore automobile maintenance, cylinder pressure, mechanical ignition timing and the influence on the system;

4. Replacing ECU, test. If fault code can remove the fault location, fault code in the ECU, if still unable to clear, is for the original ECU, repeat the process again, repair work.

2、Fault code diagnosis flow

2.1. The upstream oxygen sensor heater control circuit shorted to ground (fault code P0031)

Serial number	Operation	Vehicle speed detection	Next step
1	Connect the diagnostic instrument, ignition switch is in the "ON"		Next step
2	Dial the joint oxygen sensor wire harness, check with a multimeter, the joint 1# (connected with the oxygen sensor white relative), 2# (with the oxygen sensor cable relative to white) is 12V about the value of voltage at pin.	yes	Next step
		no	To step 4
3	Using a multimeter to check the oxygen sensor 1# (white), 2# (Baise) resistance between Pin value at 20 ℃ in 5.4~6.6 ohm	yes	Next step
		no	Replace the sensor
4	15A fuse check the main relay power lines of the fuse	yes	Replace the fuse
		no	Next step
5	X1_8# main relay X1_21# pin check ECU respectively (1# and oxygen sensor connector for connecting line is legendary white), 2# (with the oxygen sensor white connection line between pins relative) whether the circuit breaker or short circuit to ground	yes	Repair or replace the wire harness
		no	Diagnostic aid

2.2. The upstream oxygen sensor heater control circuit for the power supply circuit (fault code P0032)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint oxygen sensor wire harness, check with a multimeter, the joint 1# (connected with the oxygen sensor white relative) is about 12V value between I voltage at pin	yes	Next step
		No	To step 4
3	Using a multimeter to check the oxygen sensor 1 (white), 2#(white) resistance between Pin value at 2 ℃ in 5.4~6.6 ohm	yes	Next step
		No	Replace the sensor
4	15A fuse check the main relay power lines of the fuse	No	Replace the fuse
		yes	Next step
5	Check the ECU X1-8#, the main relay X1_21# pins respectively in sensor connector 1# (and oxygen sensor connector, relative to white) 2# (with the oxygen sensor is connected between pins relative color line) to supply short circuit)	No	Repair or replace the wire harness
		yes	Diagnostic aid

2.3. The lower the oxygen sensor heater control circuit shorted to ground (fault code P0037)

order number	Operation steps	Test results	Next step
1	Connect the diagnostic instrument, ignition switch is in the "ON"		Next step
2	Dial the joint oxygen sensor wire harness, check with a multimeter, the joint 1# (with the oxygen sensor cable relative to white) is 12V about the value of voltage at pin.	yes	Next step
		No	To step 4
3	Using a multimeter to check the oxygen sensor 1# (white), 2# (white) resistance between Pin value at 20 ℃ in 5.4~6.6 ohm	yes	Next step
		No	Replace the sensor
4	15A fuse check the main relay power lines of the fuse 15A fuse check the main relay power lines of the fuse	yes	Replace the fuse
		No	Next step
5	X1_9# main relay X1_21# pin check ECU respectively in sensor connector 1# (and oxygen sensor connector, white 2# (relative) and oxygen sensor connector pins between white relative) whether the circuit breaker or the open.	yes	Repair or replace the wire harness
		No	Diagnostic aid

2.4. The lower oxygen sensor heater control circuit for the power supply circuit (fault code P0038)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnostic instrument, ignition switch is in the "ON"		Next step
2	Dial the joint oxygen sensor wire harness, check with a multimeter, the joint 1# (and oxygen sensor connector, white 2# (relative) and oxygen sensor connector relative to white) is 12V about the value of voltage at pin.	Yes	Next step
		No	To step 4
3	Using a multimeter to check the oxygen sensor 1# (white), 2# (white) resistance between Pin value at 20 ℃ in 5.4~6.6 ohm	Yes	Next step
		No	The replacement of Xu feelings
4	15A fuse check the main relay power lines of the fuse	Yes	Replace the fuse
		No	Next step
5	Check the ECU X1_9#, the main relay X1 -- 21# pins respectively and sensor connector 1# (and oxygen sensor connector, relative to white) 2# (relative with the oxygen sensor cable) whether to short circuit of power supply pin.	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.5. Manifold pressure sensor circuit shorted to ground (fault code P0107)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnostic instrument, ignition switch is in the "ON"		Next step
2	The observed data stream "pressure", is about 101kPa (numerical and Kia)	Yes	To step 5
		No	Next step
3	Dial the joint air inlet pressure sensor on wire harness, multimeter voltage check the joint 2# and 4# pins between whether the value is about 5V	Yes	To step 5
		No	Next step
4	Check the ECU X1_60#, X1_46#, X1_48# pins were in line between the sensor connector, 1#, 2#, 4# pin is broken	Yes	Repair or replace the wire harness
		No	Next step
5	Start the engine, idle running. Slow down on the accelerator to close to the fully open, to observe the diagnostic instrument "pressure" value changes, the display values should change little; quick throttle to close to the fully open, the display values should be can instantly reach above 90kPa.	Yes	Diagnostic aid
		No	Replace the sensor

2.6. Manifold pressure sensor circuit for the power supply circuit (fault code P0108)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnostic instrument, ignition switch is in the "ON"		Next step
2	The observation data stream of "pressure". It is about 101kPa (numerical and pressure).	Yes	To step 5
		No	Next step
3	Dial the joint air inlet pressure sensor on wire harness, multimeter voltage check the joint 2# and 4# pins between whether the value is about 5V	Yes	To step 5
		No	Next step
4	Check the ECU X1_60#, X1_46#, 1_48# respectively in the line between the sensor connector for 1#, 2#, 4# pin is broken	Yes	Repair or replace the wire harness
		No	Next step
5	Start the engine, idle running. Slow down on the accelerator to close to the fully open, observation instrument monk "pressure" numerical variation diagnosis, the display value a little change; quick throttle to close to the fully open, the display values should be can instantly reach above 90kPa.	Yes	Diagnostic aid
		No	Replace the sensor

2.7. The intake air temperature sensor circuit shorted to ground (fault code P0112

Serial number	Operation steps	Inspection results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON".		Next step
2	The observation data stream in the "air temperature", whether in the intake pipe of equivalent temperature (numerical and when the engine temperature). Note: if the display value often is constant, that there may be line short circuit fault	Yes	To step 5
		No	Next step
3	Dial connection wire harness the intake air temperature sensor, using a multimeter check resistance sensor 3# and 4# pins of value is commensurate with its temperature (with specific reference to the relevant part of the repair manual).	Yes	Next step
		No	Replace the sensor
4	Dial the air intake temperature sensor connector on wire harness, multimeter voltage check the joint a# and b# pins between whether the value is about 5V	Yes	To step 6
		No	Next step
5	Check the ECU X1_56#, X1_48# between pin are respectively connected with the sensor connector, pin 3# 4# whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Next step
6	Start the engine, idle running. To observe the diagnostic instrument "air temperature" value changes, the display values should be increased along with the engine air inlet temperature	Yes	Diagnostic aid
		No	Replace the sensor

2.8. The intake air temperature sensor circuit for the power supply circuit (fault code P0113)

order number	Operation steps	Test results	Next step
1	Connect the diagnostic instrument, ignition switch is in the "ON"		Next step
2	The observed data stream "air temperature". Whether in the intake pipe of equivalent temperature (numerical and when the engine temperature). Note: if the display value of gastrointestinal constants, that there may be line short circuit fault.	Yes	To step 5
		No	Next step
3	Dial the joint air inlet pressure sensor on wire harness, electrical multimeter check sensor 3# and 4# pins of value is commensurate with its temperature (with specific reference to the evaluation of repair manual).	Yes	Next step
		No	Replace the sensor
4	Dial the joint line beam. The temperature sensor, using a multimeter check resistance sensor a# and b# pins between whether the value is about 5V	Yes	To step 6
		No	Next step
5	Check the ECU X1_56#, X1_548# between pin closure and sensor connector, pin 3# 4# whether the circuit breaker	Yes	Repair or replace the wire harness
		No	Next step
6	Start the engine, idle running. To observe the diagnostic instrument "air temperature" value changes, the display values should be increased along with the engine air inlet temperature	Yes	Diagnostic aid
		No	Replace the sensor

2.9. The coolant temperature sensor circuit output range / character error (error code P0116)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON".		Next step
2	The observed data stream "coolant temperature", and whether the engine temperature quite (numerical and when the engine temperature). Note: if the display value often is constant, that there may be circuit breaker failure.	Yes	Next step
		No	To step 4
3	Connector for coolant temperature sensor unplug the wire harness, electrical multimeter check sensor a# and c# pins of value is commensurate with its temperature (with specific reference to the relevant part of the repair manual).	Yes	Next step
		No	Repair or replace the wire harness
4	Connector for coolant temperature sensor unplug the wire harness, multimeter voltage check the joint a# and c# pins between whether the value is about 5V.	Yes	
		No	Next step
5	Check the ECU X1-31#, X1-73# between pin are respectively connected with the sensor connector, pin a# c# whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Next step
6	Start the engine, idle running. To observe the diagnostic instrument "coolant temperature" value changes, the display values should be increased along with the engine coolant temperature.	Yes	Diagnostic aid
		No	Replace the sensor

2.10. The coolant temperature sensor circuit shorted to ground (fault code P0117)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON".		Next step
2	The observed data stream "coolant temperature", and whether the engine temperature quite (numerical and when the engine temperature). Note: if the display value often is constant, that there may be circuit breaker failure.	Yes	To step 6
		No	Next step
3	Dial the connector for coolant temperature sensor wire harness, electrical multimeter check sensor a# and c# pins of value is commensurate with its temperature (with specific reference to the relevant part of the repair manual).	Yes	Next step
		No	Replace the sensor
4	Dial the connector for coolant temperature sensor wire harness, using a multimeter to check the joint line between the a#, c# pin is broken	Yes	To step 6
		No	Next step
5	Check the ECU X1_31#, X1_73# between pin are respectively connected with the sensor connector, pin a# c# whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Next step
6	Start the engine, idle running. To observe the diagnostic instrument "coolant temperature" value changes, the display values should be increased along with the engine coolant temperature	Yes	Diagnostic aid
		No	Replace the sensor

2.11. The coolant temperature sensor circuit for the power supply circuit (fault code P0118)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	The observed data stream "coolant temperature", and whether the engine temperature quite (numerical and when the engine temperature). Note: if the display value often is constant, that there may be circuit breaker failure.	Yes	To step 6
		No	Next step
3	Dial the wire harness connector on coolant temperature sensor	Yes	Next step

2.12. The coolant temperature sensor circuit discontinuity (fault code P0119)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	The observed data stream "coolant temperature", and whether the engine temperature quite (specific figures and then the engine temperature related). Note: if the display value often is constant, that there may be circuit breaker failure.	Yes	To step 6
		No	Next step
3	Dial the connector for coolant temperature sensor wire harness, electrical multimeter check sensor a# and c# pins of value is commensurate with its temperature (with specific reference to the relevant part of the repair manual).	Yes	Next step
		No	Replace the sensor
4	Dial the connector for coolant temperature sensor wire harness with a multimeter to check voltage, the joint a# and c# pins of about 5V.	Yes	To step 6
		No	Next step
5	Check the ECU X1_31#, X1_73# pin, respectively in the line between the sensor connector a#, pin is open circuit c#.	Yes	Repair or replace the wire harness
		No	Next step
6	Start the engine, idle running. Observation of the road "Party member on the coolant temperature" value changes, the display values should be increased after the engine coolant temperature and elevated.	Yes	Diagnostic aid
		No	Replace the sensor

2.13. Solar term door position sensor circuit shorted to ground (fault code P0122)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	The observation data stream of "solar term door is opening", value is between 4%~10% (numerical and models have different).	Yes	Next step
		No	To step 5
3	Slow down on the accelerator to the fully open, the observation data stream of "solar term door is opening", whether the data with the throttle opening increases to about 85~95% (specific data and models are different)	Yes	Next step
		No	To step 5
4	Repeat step 3, the observation data stream of "solar term door is opening", whether the existence of value changes in the process of change.	Yes	Replace the sensor
		No	Next step
5	Dial the joints of I solar term valve position sensor wire harness, check the ECU X1_45#, X1_38#, X1_32# pin connected circuit between a#, a#, c# pin on the sensor circuit breaker or whether, respectively on the power circuit.	Yes	Repair or replace the wire harness
		No	Next step
6	Using a multimeter to check voltage a# and b# pins of the joint between the value is about 5V.	Yes	Replace the sensor
		No	Diagnostic aid

2.14. Solar term door position sensor circuit for the power supply circuit (fault code P0123)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	The observation data stream of "solar term door is opening", value is between 4 $~10% (numerical and models have different).	Yes	Next step
		No	To step 5
3	Slow down on the accelerator to the fully open, the observation data stream of "solar term door is opening" think, numerical with the throttle opening increases to about 85~95% (specific numerical models are different, and in).	Yes	Next step
		No	To step 5
4	Repeat step 3, the observation data stream of "solar term door is opening", whether the existence of value changes in the process of change.	Yes	Replace the sensor
		No	Next step
5	Solar term door shifting joint position sensor wire harness between ECU, check X1_45#, X1_38#, X1_32#, a#, b# dB and sensor connector, pin, c# whether the circuit breaker short-circuit or short circuit of power supply.	Yes	Repair or replace the wire harness
		No	Next step
6	Using a multimeter to check voltage a# and b# pins of the joint between the value is about 5V	Yes	Replace the sensor
		No	Diagnostic aid

2.15. The oxygen sensor circuit fault (fault code P0130)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 43# X1_59# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.16. Oxygen sensor circuit output voltage is too low (fault code P0131)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 43# X1_59# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.17. Oxygen sensor circuit output voltage is too high (fault code P0132)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 43# X1_59# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.18. The oxygen sensor is not active (error code: P0134)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 43# X1_59# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.19. The oxygen sensor circuit fault (fault code P0136)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 42# X1_37# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.20. Oxygen sensor circuit output voltage is too low (fault code P0137)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 42# X1_37# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.21. Oxygen sensor circuit output voltage is too high (fault code P0138)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 42# X1_37# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.22. The oxygen sensor is not active (fault code P0140)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Start the engine, idle running to the coolant temperature reach normal values, observe diagnosis instrument monk "oxygen sensor voltage" items to pay changes, the display values should lose uncle is in the range of 100Ma~900mA	Yes	Diagnostic procedures
		No	Next step
3	Check the ECU X1 -- 42# X1_37# pins respectively in sensor connector 3# (with the oxygen sensor grey connection line between pins) line is faulty.	Yes	Repair or replace the wire harness
		No	Next step
4	Exhaust system blocking Fuel injector is leaking Fuel pressure is too large Valve clearance is too small.	Yes	Maintenance according to the diagnosis
		No	Diagnostic aid

2.23. Pump primary line fault (fault code P0230)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "OFF"		Next step
2	Pulling off the fuel pump relay, the ignition switch to "ON", respectively, check the pump relay power supply terminal 30# 86# power supply voltage pin and pay some value is around 12V	Yes	To step 4
		No	Next step
3	Check relay power supply line is broken or short circuit to ground.	Yes	Repair or replace the wire harness
		No	To step 2
4	Check with a multimeter pump relay control terminal relay 85# pins and power to pay a few pieces of the resistance value is about 3.7V.	Yes	Replace the fuel pump relay
		No	Next step
5	Check relay control end is between the X1_69# pin and the ECU pin relay 85# whether the circuit breaker or the power or the open.	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.24. A cylinder injector circuit shorted to ground (fault code P0261)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_24# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.		Repair or replace the wire harness
			Diagnostic aid

2.25. A cylinder injector circuit for the power supply circuit (fault code P0262)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_24# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.26. Two cylinder injector circuit shorted to ground (fault code P0264)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_62# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.27. Two cylinder injector circuit for the power supply circuit (fault code P0265)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_62# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.		Repair or replace the wire harness
			Diagnostic aid

2.28. Three cylinder injector circuit shorted to ground (fault code P0267)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_61# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.	Yes	Repair or replace the wire harness
			Diagnostic aid

2.29. Three cylinder injector circuit for the power supply circuit (fault code P0268)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_61# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.		Repair or replace the wire harness
			Diagnostic aid

2.30. Four cylinder injector circuit shorted to ground (fault code P0270)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_23# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.		Repair or replace the wire harness
			Diagnostic aid

2.31. Four cylinder injector circuit for the power supply circuit (fault code P0271)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint stiffness of injector on wire harness, using a multimeter to check the connector SM1# pin voltage and power for a few pieces of value is a 12V.	Yes	To step 4
		No	Next step
3	Check in between a cylinder injector connector SM# pin and the main relay line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check a resistor between the fuel injectors for cylinders SM1# and SM2# pins at 20 ℃ in 14.5+/-0.5 ohm	Yes	Next step
		No	Replace injector
5	Whether the 3.7 Ω voltage with a multimeter to check a cylinder injector connector 2# pin and the negative pole of the power supply will be.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_23# pin check cylinder injector connector 2# pin and the ECU line is broken or the power supply or short circuit to ground.		Repair or replace the wire harness
			Diagnostic aid

2.32. The knock sensor fault (fault code P0325)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument		Next step
2	Dial the joint of the knock sensor wire harness, using a multimeter to check the connection between 1# 2# and ECUX1_10 X1_54 is short-circuited pin。	Yes	Repair or replace the wire harness
		No	Next step
3	Dial the joint of the knock sensor wire harness, using a multimeter to check the connection between 1# 2# and ECUX1_1 X1_2 is short-circuited pin.	Yes	Repair or replace the wire harness
		No	Next step
4	The replacement of the knock sensor, check whether the fault has disappeared.	Yes	Replace the sensor
		No	Diagnostic aid

2.33. The crankshaft position sensor circuit fault (fault code P0335)

Serial number	Operation steps	Test results	Next step
1	Ground which is diagnostic instrument, the ignition switch is in the "OFF"		Next step
2	Dial the joint curve position sensor wire harness, electrical multimeter to check the sensor 2# and 3# pins between the value at 20 ℃ in 770~950 ohm.	Yes	Next step
		No	Replace the sensor
3	Check sensor connector, 2# 3# and ECU X1_29# X1_27# between whether the circuit breaker or the power supply or short circuit to ground. Check the 1# connector with the main relay output that is between the X1_27 pin ECU line is broken or the power supply or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Check the flywheel signal disc is intact.	Yes	Diagnostic aid
		No	Replace the signal disc

2.34. The camshaft position sensor fault (fault code P0340)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint sensor wire harness, using a multimeter to check voltage between the 3# and 2# pins connector on sensor placement is around 12V.	Yes	To step 4
		No	Next step
3	Check phase sensor 3# pin and 87# pin of the main relay whether the circuit breaker or open ground; between the X1_30# pin check phase sensor 2# pins with the ECU whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Next step
4	If the 9.9V about the value of voltage between the X1_72# pin and the negative pole of the power supply check phase sensor connector 1# pin and ECU.	Yes	To step 6
		No	Next step
5	Between the X1_72# pin check phase sensor connector 1# pin and the ECU whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Next step
6	Check the camshaft signal wheel is intact.	Yes	Diagnostic aid
		No	Replace the signal disc

2.35. A cylinder ignition coil circuit fault (fault code P0351)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint on wire harness for ignition coil, using a multimeter to check voltage between the 2# pin and the negative pole of the power supply is 12V.	Yes	To step 4
		No	Next step
3	Check the ignition coil between the 2# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground;	Yes	Repair or replace the wire harness
		No	To step 5
4	Between the X1_4# pin check phase sensor and papillary 3# pins and ECU line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
5	Using a multimeter to check the ignition coil resistance 2# pin and 3# pin between, stop should be 0.67 +/-10%	Yes	Next step
		No	Replace ignition coil
6	By using the universal resistance between the table to check the ignition coil 1 cylinder column and ignition anode, stop should be 9.2K Ω +/-20%	Yes	Diagnostic aid
		No	Replace ignition coil

2.36. Two cylinder ignition coil circuit fault (fault code P0352)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint on wire harness for ignition coil, using a multimeter to check voltage between the 2# pin and the negative pole of the power supply is 12V.	Yes	To step 4
		No	Next step
3	Check the ignition coil between the 2# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground;	Yes	Repair or replace the wire harness
		No	To step 5
4	Between the A31# pin check phase sensor and papillary 1# pins and ECU line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
5	Using a multimeter to check the ignition coil resistance 1# pin and 2# pin between, stop should be 0.67 +/-10%	Yes	Next step
		No	Replace ignition coil
6	By using the universal resistance between the table to check the ignition coil 2 cylinder column and ignition anode, stop should be 9.2K Ω +/-20%	Yes	Diagnostic aid
		No	Replace ignition coil

2.37. Three cylinder ignition coil circuit fault (fault code P0353)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint on wire harness for ignition coil, using a multimeter to check voltage between the 2# pin and the negative pole of the power supply is 12V.	Yes	To step 4
		No	Next step
3	Check the ignition coil between the 2# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground;	Yes	Repair or replace the wire harness
		No	To step 5
4	Between the A31# pin check phase sensor and papillary 1# pins and ECU line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
5	Using a multimeter to check the ignition coil resistance 1# pin and 2# pin between, stop should be 0.67 +/-10%	Yes	Next step
		No	Replace ignition coil
6	By using the universal resistance between the table to check the ignition coil 3 cylinder column and ignition anode, stop should be 9.2K Ω +/-20%	Yes	Diagnostic aid
		No	Replace ignition coil

2.38. Four cylinder ignition coil circuit fault (fault code P0354)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint on wire harness for ignition coil, using a multimeter to check voltage between the 2# pin and the negative pole of the power supply is 12V.	Yes	To step 4
		No	Next step
3	Check the ignition coil between the 2# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground;	Yes	Repair or replace the wire harness
		No	To step 5
4	Between the A32# pin check phase sensor and papillary 3# pins and ECU line is open circuit or short circuit to ground.	Yes	Repair or replace the wire harness
		No	Next step
5	Using a multimeter to check the ignition coil resistance 2# pin and 3# pin between, stop should be 0.67 +/-10%	Yes	Next step
		No	Replace ignition coil
6	By using the universal resistance between the table to check the ignition coil 4 cylinder column and ignition anode, stop should be 9.2K Ω +/-20%	Yes	Diagnostic aid
		No	Replace ignition coil

2.39. Carbon irrigation control valve (open circuit fault code P0444)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint on wire harness for ignition coil, using a multimeter to check voltage between the 2# pin and the negative pole of the power supply is 12V.	Yes	To step 4
		No	Next step
3	Check that the carbon canister control valve power supply line is broken or open ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check the carbon canister control resistance between the 1# and 2# pins of the valve value at 20 ℃ is 26 ℃	Yes	Next step
		No	Replace the control valve
5	Using a multimeter to check the carbon canister control valve street is about 3.7V voltage 2# pin and cathode will the house.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_26# pin to check the carbon canister control valve connector 2# pin and the ECU whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.40. Carbon irrigation control valve (short circuit fault code P0445)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "ON"		Next step
2	Dial the joint on wire harness for ignition coil, using a multimeter to check voltage between the 2# pin and the negative pole of the power supply is 12V.	Yes	To step 4
		No	Next step
3	Check that the carbon canister control valve power supply line is broken or open ground.	Yes	Repair or replace the wire harness
		No	Next step
4	Using a multimeter to check the carbon canister control resistance between the 1# and 2# pins of the valve value at 20 ℃ is 26 ℃	Yes	Next step
		No	Replace the control valve
5	Using a multimeter to check the carbon canister control valve street is about 3.7V voltage 2# pin and cathode will the house.	Yes	Diagnostic aid
		No	Next step
6	Between the X1_26# pin to check the carbon canister control valve connector 2# pin and the ECU whether the circuit breaker.	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.41. The speed sensor is not working properly (fault code P0501)

Serial number	Operation steps	Test results	Next step
1	round which is diagnostic instrument, the ignition switch is in the "OFF"		Next step
2	If the vehicle equipped with ABS system, ABS System Pro check whether there is a fault code.	Yes	Check ABS system
		No	Next step
3	Check the speed table pointer is working properly.	Yes	Next step
		No	Maintenance instrument line
4	Check whether the normal work of the vehicle speed sensor.	Yes	Next step
		No	The replacement of the speed sensor
5	The X1_39# pin signal line to check the speed sensor and ECU	Yes	Repair or replace the wire harness
		No	Next step

2.42. Idle speed step motor fault (fault code P0505)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the idle adjuster connector, electrical idling regulator of A and D and the B and C pins between the value at 20 ℃ is 53 ± 5.3 Ω were examined using a multimeter.		Next step
			The replacement of the stepper motor
3	Between the check idle adjuster connector A, pin and the D ECU X1_19#, X1_20# pin, idle adjuster connector B between pin and ECU, C X1_35, X1_36# pin line is open circuit, short circuit.		Repair or replace the wire harness
			Diagnostic aid

2.43. The system voltage fault (fault code P0560)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "OFF"		Next step
2	using a multimeter to check whether the battery voltage is about 12V	Yes	Next step
		No	Replace the battery
3	The 87# pin check ECU X1_67# and the main relay the line between whether there is open circuit or short circuit to ground, the X1-22# pin and the ignition switch power supply line is broken or between the short circuit, X1_44, X1_63 and the positive pole of the power supply line is broken or on earth is short.	Yes	Repair or replace the wire harness
		No	Next step
4	Start the engine, check engine charging voltage in different speed range is between 9-16V	Yes	Next step
		No	Changing engine
5	Check the engine wiring harness ground is good	Yes	Diagnostic aid
		No	Repair or replace the wire harness

2.44. Internal control (read-only memory) fault (fault code P0605)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnostic instrument, wait for 30 seconds or more, to the ignition switch is in the "ON"		Next step
2	Check whether the fault code	Yes	To step 3
		No	
3	Switch off ignition, disconnect the battery positive power supply, waiting for more than 30 seconds, to the ignition switch is in the "ON". Check whether there is a fault code	Yes	The replacement of ECU
		No	

2.45. Fault display lamp control circuit fault (fault code P0650)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		What's nex
2	Pulling off the fault lamp connector, pin voltage check 1# and dia warm cathode will is about 12V		To step 4
			Next step
3	Check the main relay power supply circuit, short circuit, open circuit fault exists.		Repair or replace the wire harness
			To step 5
4	Check the 2# pin and ECU pin X! _70 association exists between the open circuit fault.		Repair or replace the wire harness
			What's nex
5	Check the fault lamp if there is a problem		Diagnostic aid
			Replace faulty lamp

2.46. Air-conditioning evaporator temperature sensor for short circuit or open circuit (power line fault code P1535)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	The observation data stream in the "evaporator temperature", and whether the engine temperature quite (numerical and then temperature.). Note: if the display value often is constant, that there may be circuit breaker failure.		To step 4
			Next step
3	Check the ECU X1_12# X _!! 2# pins respectively with the line between the sensor connector a# b# pin is open circuit, short circuit fault.		Repair or replace the wire harness
			Next step
4	Start the engine, open space, part load operation. Square diagnostic instrument "the evaporator temperature" value changes, the display values should be with the engine running down, until the 5 degrees celsius.		Diagnostic aid
			Replace the sensor

2.47. Short circuit on the air conditioning evaporator temperature sensor circuit (fault code P1536)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	The observation data stream in the "evaporator temperature", and whether the engine temperature quite (numerical and then temperature.). Note: if the display value often is constant, that there may be circuit breaker failure.	Yes	To step 4
		No	Next step
3	Check the ECU X1_12# X _!! 2# pins respectively with the line between the sensor connector a# b# pin is open circuit, short circuit fault.	Yes	Repair or replace the wire harness
		No	Next step
4	Start the engine, open space, part load operation. Square diagnostic instrument "the evaporator temperature" value changes, the display values should be with the engine running down, until the 5 degrees celsius.	Yes	Diagnostic aid
		No	Replace the sensor

2.48. Air-conditioning high-voltage switch or air conditioning clutch relay line fault (fault code P1545)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the fan connectors relay on wire harness, multimeter voltage check fan relay connector 85# 86# pin and additional power between the value is about 12V.	Yes	To step 4
		No	Next step
3	Check the fan relay between the 85# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground; check the fan relay between 86# positive power supply pin and whether the circuit breaker	Yes	Repair or replace the wire harness
		No	To step 5
4	Check the fan power supply circuit fuse is intact. Check fan relay 87# increased with the fan power line is open circuit or short circuit to ground	Yes	Repair or replace the wire harness
		No	Next step
5	Check the fan relay connector 85# between pin and ECU X_68# pin line is open circuit or short circuit to ground	Yes	Repair or replace the wire harness
		No	Next step
6	High voltage switch circuit and the switch to check whether the damage to the air conditioning compressor	Yes	Replace the switch
		No	Diagnostic aid

2.49. Cooling fan relay line fault (fault code P1624)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the fan connectors relay on wire harness, multimeter voltage check fan relay connector 85# 86# pin and additional power between the value is about 12V.	Yes	To step 4
		No	Next step
3	Check the fan relay between the 85# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground; check the fan relay between 86# positive power supply pin and whether the circuit breaker	Yes	Repair or replace the wire harness
		No	To step 5
4	Check the fan power supply circuit fuse is intact. Check fan relay 87# increased with the fan power line is open circuit or short circuit to ground	Yes	Repair or replace the wire harness
		No	Next step
5	Check the fan relay connector 85# between pin and ECU X_65# pin line is open circuit or short circuit to ground	Yes	Repair or replace the wire harness
		No	Diagnostic aid

2.50. Air-conditioning compressor fan relay or fan line fault (fault code P1625)

Serial number	Operation steps	Test results	Next step
1	Connect the diagnosis instrument, the ignition switch is in the "ON"		Next step
2	Dial the fan connectors relay on wire harness, multimeter voltage check fan relay connector 85# 86# pin and additional power between the value is about 12V.	Yes	To step 4
		No	Next step
3	Check the fan relay between the 85# pin and the 87# pin of main relay circuit is open circuit or short circuit to ground; check the fan relay between 86# positive power supply pin and whether the circuit breaker	Yes	Repair or replace the wire harness
		No	To step 5
4	Check the fan power supply circuit fuse is intact. Check fan relay 87# increased with the fan power line is open circuit or short circuit to ground	Yes	Repair or replace the wire harness
		No	Next step
5	Check the fan relay connector 64# between pin and ECU X_68# pin line is open circuit or short circuit to ground	Yes	Repair or replace the wire harness
		No	Diagnostic aid

3. The fault diagnosis according to the fault phenomena

In this note the fault appears after the preliminary examination

Before starting the engine fault diagnosis according to the fault phenomena should be the first step, a preliminary inspection:

(1) Confirm the engine fault indicator light work;

(2) Diagnosis instrument for inspection to confirm the absence of fault, fault information record;

(3) Confirmed the existence of fault phenomena of complaints, and confirm that the failure condition.

Then the visual inspection:

(1) Check whether the fuel pipeline leak;

(2) Check that the vacuum line whether there is fault, kink, the connection is correct;

(3) Check the intake pipeline is blocked, leakage, crushed or damaged;

(4) The high-pressure line check ignition system is broken, aging, ignition sequence is correct;

(5) Check the wiring harness ground is clean, firm;

(6) Check the sensor, actuator connector is loose or poor contact.

Important: if the above phenomenon exists, then the fault phenomenon of repair work, otherwise it will affect the later

Fault diagnosis and repair work.

3.1. Starting when the engine does not turn or move slowly

General fault location:

1. The battery;
2. Starting motor;
3. Harness or ignition switch;
4. The engine mechanical part.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Using a multimeter to check the battery voltage between two terminals, whether the voltage of more than 8~12V when the engine start.	Yes	Next step
		No	Replace the battery
2	The ignition switch is maintained at the start position, using a multimeter to check whether the terminal to start the motor positive voltage above 8V.	Yes	Next step
		No	Repair or replace the wire harness
3	Starting motor disassembly, inspection starting motor. Focus on examination of whether there is open circuit or due to insufficient lubrication card dead.	Yes	Repair or replace the starter motor
		No	Next step
4	If the failure is occurred in the winter, then check for engine oil and gear selecting improper lead to start the motor power is too large.	Yes	The lubricating oil for the appropriate label
		No	Next step
5	Check the engine internal mechanical power is too large, leading to start the motor does not rotate or move slowly	Yes	Maintenance of internal engine power
		No	Repeat the above steps

3.2. Starting the engine can drag but failed to start

General fault location:

1. No oil tank;
2. The fuel pump;
3. Speed sensor;
4. The ignition coil;
5. The engine mechanical part.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idling condition is about 380kPa	Yes	Next step
		No	Maintenance supply coefficient
2	Connect the EFI system diagnostic instrument, to observe the "engine" of data items, start the engine, observe whether there is a speed signal output.	Yes	Next step
		No	Repair speed sensor circuit
3	Appropriated the sub-cylinder line a cylinder which is connected to, spark plug, spark plug electrode distance engine body around 5mm, start the engine, check whether there is a blue and white high pressure fire	Yes	Next step
		No	Maintenance of the ignition system
4	Check the engine cylinder pressure of each engine cylinder pressure, observe whether the lack of	Yes	Exclusion of unloading failure of engine
		No	Next step
5	Check the X1-1# X1-2# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.3. Hot starting difficulty

General fault location:

1. The fuel moisture content;
2. The fuel pump;
3. The coolant temperature sensor;
4. The fuel pressure regulator vacuum tube;
5. The ignition coil.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idling condition is about 380kPa	Yes	Next step
		No	Maintenance supply coefficient
2	Appropriated the sub-cylinder line a cylinder which is connected to, spark plug, spark plug electrode distance engine body around 5mm, start the engine, check whether there is a blue and white high pressure fire	Yes	Next step
		No	Maintenance of the ignition system
3	Pulling off the coolant temperature sensor connector, start the engine, when the engine is started successfully observed. (a 300 ohm resistor in series or in the coolant temperature sensor connector to replace coolant sensor, observation of the engine is successful start)	Yes	Repair or replace the sensor line
		No	Next step
4	Check the fuel pressure regulator vacuum tube whether there is loose or leakage phenomenon.	Yes	Repair or replace
		No	Next step
5	Check the fuel situation, observe whether the failure phenomenon was caused due to gas.	Yes	Replace fuel
		No	Next step
6	Check the X1_1# X1_2# pin on the iron is normal.	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.4. Cold vehicle starting difficulty

General fault location:

1. The fuel moisture content;
2. The fuel pump;
3. The coolant temperature sensor;
4. The fuel injector;

5. The ignition coil;
6. Solar term door body and idle bypass airway;
7. The engine mechanical part.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idling condition is about 3800kPa	Yes	Next step
		No	Maintenance of oil supply system
2	Set aside seven minutes a cylinder cylinder line, connected to the spark plug, spark machine from the engine body around 5mm, start the engine, check whether there is a blue and white high pressure fire	Yes	Next step
		No	Maintenance of the ignition system
3	Pulling off the coolant temperature sensor connector, start the engine, the engine is successful up observation. （Or a 2500 OHM Series in the coolant temperature sensor junction resistance to replace the coolant temperature sensor, observation of the engine is successful.）	Yes	Repair or replace the sensor line
		No	Next step
4	Gently down on the accelerator, observe whether easy to start	Yes	Cleaning solar term door and idle airway
		No	Next step
5	Remove the injector, injector clogging with special cleaning analyzer check whether the injector is there is a leak, or in.	Yes	Failure to replace
		No	Next step
6	Check the fuel situation, observe whether the fault now just gas caused by.	Yes	Replace fuel
		No	Next step
7	Check the engine cylinder pressure of each engine cylinder pressure, observe whether there is insufficient.	Yes	Remove engine mechanical fault
		No	Next step
8	Check the X1+! # X1_2# pin on iron is normal.	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.5. Speed normal, any time starting difficulty
General fault location:
1. The fuel moisture content; 2, The fuel pump; 3. Coolant temperature sensor. 4. Injector; 5. Ignition coil; 6. Solar term door body and idle bypass airway. 7. Inlet; 8. The ignition timing; 9. Spark plug. 10. The engine mechanical part.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the air filter is clogged, the intake pipe is leaking	Yes	Maintenance of air intake system
		No	Next step
2	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idling condition is about 38kPa	Yes	Next step
		No	Maintenance of oil supply system
3	Appropriated the sub-cylinder line a cylinder which is connected to, spark plug, spark plug electrode distance of engine is about 5mm, the starting engine, check whether there is a blue and white high pressure fire	Yes	Next step
		No	Maintenance of the ignition system
4	Check the cylinder spark plug, the period of observation model and gap four conformance to specification.	Yes	Next step
		No	Adjust or replace
5	Pulling off the coolant temperature sensor connector, start the engine, the engine is starting to observe	Yes	Repair or replace the sensor line
		No	Next step
6	Check the fuel situation, observe whether the fault now just gas caused by.		Cleaning solar term door and idle airway
			Next step
7	Gently down on the accelerator, observe whether easy to start.		Failure to replace
			Next step
8	Check the fuel situation, observe whether the failure phenomenon was caused due to gas		Replace fuel
			Next step
9	Check the engine cylinder pressure of each engine cylinder pressure, observe whether there is insufficient		Remove engine mechanical fault
			Next step
10	Check the ignition sequence engine and ignition timing meets the specifications		Next step
			Maintenance of the ignition timing
11	Check the X1_1# X1_2# pin ground is normal		Diagnostic aid
			Maintenance of the corresponding line

3.6. Start normal, but any time idling instability

General fault location:

1. The fuel moisture content;
2. The fuel injector;

3. The spark plug;
4. Solar term door body and idle bypass airway;
5. The inlet;
6. Idle speed regulator;
7. The ignition timing;
8. The spark plug;
9. The engine mechanical part.

The general procedure of diagnosis

Serial number	Operation steps	Test results	Next step
1	Check the air filter is clogged, the intake pipe is leaking	Yes	Check the intake system
		No	Next step
2	Check whether the card idle speed regulator	Yes	Clean or replace
		No	Next step
3	Check the cylinder spark plug, observe its model and gap meets the specifications	Yes	Next step
		No	Adjust or replace
4	Check the solar term door body and idle speed organ exists the phenomenon of carbon deposition	Yes	Clean
		No	Next step
5	Remove the injector, injector with special cleaning analyzer to check whether the injector is there is a leak, plugging or flow ultra difference phenomenon	Yes	Failure to replace
		No	Next step
6	Check the fuel situation, observe whether the failure phenomenon was caused due to gas	Yes	Replace fuel
		No	Next step
7	Check the engine cylinder pressure of each engine cylinder pressure, observe whether there are differences in the larger	Yes	Remove engine mechanical fault
		No	Next step
8	Compliance with the specification when ignition ignition sequence checking engine.	Yes	Next step
		No	Maintenance of the ignition timing
9	Check the X1_1# X1_1# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.7. Start, warm-up process unstable idle speed
General fault location:
1. The fuel moisture content;
2. The coolant temperature sensor;
3. The spark plug;

4. Solar term door body and idle bypass airway;
5. The inlet;
6. Idle speed regulator;
7. The engine mechanical part.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the air filter is clogged, the intake pipe is leaking	Yes	Check the intake system
		No	Next step
2	Check whether the card idle speed regulator	Yes	Next step
		No	Adjust or replace
3	Check the cylinder spark plug, observe its model and gap meets the specifications	Yes	Cleaning of parts
		No	Next step
4	Check the solar term door body and idle speed organ exists the phenomenon of carbon deposition	Yes	Trim lines or replacement of the sensor
		No	Next step
5	Remove the injector, injector with special cleaning analyzer to check whether the injector is there is a leak, plugging or flow ultra difference phenomenon	Yes	Failure to replace
		No	Next step
6	Check the fuel situation, observe whether the failure phenomenon was caused due to gas	Yes	Replace fuel
		No	Next step
7	Check the engine cylinder pressure of each engine cylinder pressure, observe whether there are differences in the larger	Yes	Remove engine mechanical fault
		No	Next step
8	Compliance with the specification when ignition ignition sequence checking engine.	Yes	Next step
		No	Maintenance of the ignition timing
9	Check the X1_1# X1_1# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.8. Start, warm-up after idling instability
General fault location:
1. The fuel moisture content;
2. The coolant temperature sensor;

3. The spark plug;
4. Solar term door body and idle bypass airway;
5. The inlet;
6. Idle speed regulator;
7. The engine mechanical part.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the air filter is clogged, the intake pipe is leaking	Yes	Check the intake system
		No	Next step
2	Check whether the card idle speed regulator	Yes	Clean or replace
		No	Next step
3	Check the cylinder spark plug, observe its model and gap meets the specifications	Yes	Next step
		No	Adjust or replace
4	Check the solar term door body and idle speed organ exists the phenomenon of carbon deposition	Yes	Clean
		No	Next step
5	Remove the injector, injector with special cleaning analyzer to check whether the injector is there is a leak, plugging or flow ultra difference phenomenon	Yes	Failure to replace
		No	Next step
6	Check the fuel situation, observe whether the failure phenomenon was caused due to gas	Yes	Replace fuel
		No	Next step
7	Check the engine cylinder pressure of each engine cylinder pressure, observe whether there are differences in the larger	Yes	Remove engine mechanical fault
		No	Next step
8	Compliance with the specification when ignition ignition sequence checking engine.	Yes	Next step
		No	Maintenance of the ignition timing
9	Check the X1_1# X1_1# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.9. Normal starting, part load (such as: air conditioning) when idling instability or flameout
General fault location:
1. Air-conditioning system;

2. Idle speed regulator;
3. The fuel injector.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Remove the idle adjuster, check the solar term door body, idle speed and idle bypass airway carbon deposition	Yes	Cleaning of parts
		No	Next step
2	Observation on the output power of the engine is increased when the air conditioning, the phenomenon of EFI system diagnosis instrument of ignition advance angle, injection pulse width and air conditioning, wiring harness end is a high level signal.	Yes	To step 4
		No	Next step
3	Disconnect the electrical control unit X1_68# pin connecting line, check the open air conditioning, wiring harness end is a high level signal.	Yes	Next step
		No	Maintenance of air-conditioning system
4	Check system pressure, air conditioning compressor electromagnetic clutch and the air conditioning compressor pump is normal	Yes	Next step
		No	Maintenance of air-conditioning system
5	Remove the injector, injector with special cleaning analyzer check whether the injector is there is a leak, plugging or flow ultra difference phenomenon	Yes	Failure to replace
		No	Next step
6	Check the X1_1# X1_2# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.10. Normal starting, idle speed is too high
General fault location:

1. Solar term door body and idle bypass airway;
2. The vacuum tube;
3. Idle speed regulator;
4. The coolant temperature sensor;
5. The ignition timing.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the throttle cable is stuck or too tight	Yes	Adjustment
		No	Next step
2	Check the intake system and vacuum pipe connection whether there is leakage	Yes	Maintenance of air intake system
		No	Next step
3	Remove the idle adjuster, solar term door body check, idle speed regulator and idle speed was the existence of the phenomenon of carbon deposition in the airway	Yes	Cleaning of parts
		No	Next step
4	Pulling off the coolant temperature sensor connector, start the engine, when the engine is idling too high observation	Yes	Repair or replace the sensor line
		No	Next step
5	Check the engine ignition timing meets the specifications	Yes	Next step
		No	Maintenance of the ignition timing
6	Check the X1_1# X1_2# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.11. Accelerate the speed to go up not to go or stop

General fault location:

1. The fuel moisture content;
2. The intake pressure sensor and solar term door position sensor;
3. The spark plug;
4. Solar term door body and idle bypass airway;
5. The inlet;
6. Idle speed regulator;
7. The fuel injector;
8. The ignition timing;
9. The exhaust pipe.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the air filter is clogged	Yes	Maintenance of air intake system
		No	Next step
2	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idling condition is about 390kPa	Yes	Next step
		No	Maintenance of oil supply system
3	Check the cylinder spark plug, observe its model and gap meets the specifications	Yes	Next step
		No	Adjust or replace
4	Remove the idle adjuster, check the solar term door body, idle speed regulator and idling bypass airway carbon deposition.	Yes	Cleaning of parts
		No	Next step
5	Check the intake pressure sensor, solar term door position sensor and think you are normal.	Yes	Next step
		No	Repair or replace the sensor line
6	Remove the injector, injector with special cleaning analyzer check whether the injector is there is a leak or blockage	Yes	Failure to replace
		No	Next step
7	Check the fuel situation, in order to observe the phenomena of four since just after refueling cause	Yes	Failure to replace
		No	Next step
8	Check the ignition sequence engine and ignition timing meets the specifications	Yes	Next step
		No	Maintenance of the ignition timing
9	Check whether the smooth air exhaust pipe	Yes	Next step
		No	Repair or replace the exhaust pipe
10	Check the X1_1# X1_2# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.12. Accelerating the slow response

General fault location:

1. The fuel moisture content;
2. The intake pressure sensor and solar term door position sensor;
3. The spark plug;
4. Solar term door body and idle bypass airway;
5. The inlet;
6. Idle speed regulator;
7. The fuel injector;
8. The ignition timing;
9. The exhaust pipe.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the air filter is clogged	Yes	Maintenance of air intake system
		No	Next step
2	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idle condition is about 380kPa	Yes	Next step
		No	Maintenance of oil supply system
3	Check the cylinder spark plug, observe its model and gap meets the specification	Yes	Next step
		No	Adjust or replace
4	Remove the idle adjuster, check the solar term door body, idle speed regulator and idling bypass airway carbon deposition.	Yes	Cleaning of parts
		No	Next step
5	Check the intake pressure sensor, solar term door position sensor and think you are normal.	Yes	Next step
		No	Repair or replace the sensor line
6	Remove the injector, injector with special cleaning analyzer check whether the injector is there is a leak or blockage	Yes	Failure to replace
		No	Next step
7	Check the fuel situation, in order to observe the phenomena of four since just after refueling cause	Yes	Failure to replace
		No	Next step
8	Check the ignition sequence engine and ignition timing meets the specifications	Yes	Next step
		No	Maintenance of the ignition timing
9	Check whether the smooth air exhaust pipe	Yes	Next step
		No	Repair or replace the exhaust pipe
10	Check the X1_1# X1_2# pin on the iron is normal	Yes	Diagnostic aid
		No	Maintenance of the corresponding line

3.13. Accelerating weakness, poor performance

General failure position:

1. Fuel moisture content; 2. The intake pressure sensor and solar term door position sensor;
3. Spark plug; 4. The ignition coil; 5. Solar term door body and idle bypass airway;
6. Inlet; 7. Idle speed regulator; 8. Injector; 9. The ignition timing; 10. The exhaust pipe.

The general procedure of diagnosis:

Serial number	Operation steps	Test results	Next step
1	Check the clutch slip, the tire pressure is low, the brake drag, the tire size is incorrect, four wheel positioning is not correct faults.	Yes	Repair
		No	Next step
2	Check the air filter is clogged.	Yes	Maintenance of air intake system
		No	Next step
3	Connect the fuel pressure gauge (access point for the fuel distribution pipe assembly inlet pipe end), start the engine, check the fuel pressure in the idling condition is about 38kPa.	Yes	Next step
		No	Maintenance of oil supply system
4	Set aside money in a cylinder of the cylinder, connected to the spark plug, the spark plug electrode distance engine body around 5mm, start the engine, check the high-pressure fire intensity is normal.	Yes	Next step
		No	Maintenance of the ignition system
5	Check the cylinder spark plug, observe its model and gap whether payment specification.	Yes	Next step
		No	Adjust or replace
6	Remove the idle adjuster, check the solar term door body, idle speed regulator and idling on airway carbon deposition	Yes	Cleaning of parts
		No	Next step
7	Check the intake pressure sensor, solar term door position sensor and its circuit is normal	Yes	Next step
		No	Repair or replace the sensor line
8	Remove the injector, injector with special cleaning analyzer check whether the injector is there is a leak or blockage.	Yes	Failure to replace
		No	Next step
9	Check the fuel situation, observe whether the failure phenomenon was caused due to gas	Yes	Replace fuel
		No	Next step
10	Check the engine ignition is Xu and ignition timing specification compliance	Yes	Next step
		No	Maintenance of the ignition timing
11	Check whether the smooth air exhaust pipe		Next step
			Repair or replace the exhaust pipe
12	Check the X1_1# X1_2# pin on the iron is normal		Diagnostic aid
			Maintenance of the corresponding line

Overhaul Info……12-1
Troubleshooting……12-2
Replacing bulbs……12-3
headlight……12-5
Ignition Switch……..12-5
Combined switch……..12-6
Brake Light Switch…….12-8
Horn…… 12-8

Overhaul Information

Warning

- Headlight bulb will be very hot when it is turned on. Do not touch it after it is just turned off. Operation should be done when the bulb is cooled down.
- Inspection of water temperature alarm may use fire source and liquid of high temperature. Do not put flammable matters nearby and take care not to get burnt.
- The temperature of headlight is quite high when turned on. Replacing with bare hand or stained glove will cause oil stains on the glass face which may form hot spot and cause deformation of glass face and damage to bulb.
- Pay attention to the following when replacing the bulb.
  —Do not replace the bulb when it is turned on. Keep ignition switch in the OFF position, and replace after the bulb is cooled down.
  —Replace the bulb with hands in clean gloves to avoid oil stains on the glass surface.
  —Clean the glass with a clean rag dipped in alcohol or isoamyl acetate in case of any oil stains on the glass surface.
- If the Inspection has to be done with battery, check if the battery is normal.
- Inspection of switch continuity can be done without removing the switches from the vehicle.
- After the inspecting and overhauling of each part, cables and wires should be routed properly (chapter 1) Refer to Chapter 2 for removal and installation of taillight and rear turning lights.

Overhaul Standard

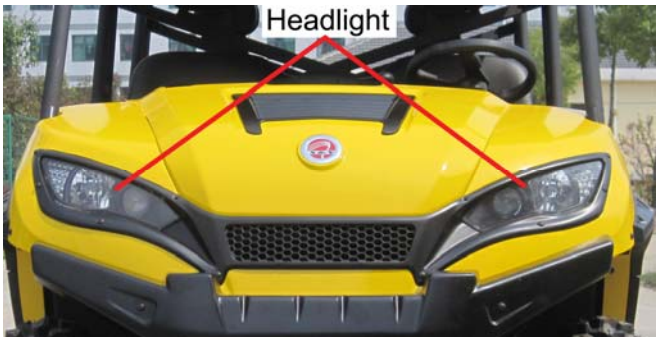
Item			Standard
Fuse		Mail switch fuse	30A
		Sub-fuse	10A 20A 30A
Light, bulb	Headlight	Head lamp	**12 V 55 W× 2**
		Front position lamp	**12 V 5 W**
		Front direction indicator	**12 V 1.6 W (15*LED)**
	Brake light /Tail light	Stop lamp	**12 V 1.8 W (12*LED)**
		Rear position lamp	**12 V 0.2 W (12*LED)**
		Rear direction indicator	**12 V 2 W (15*LED)**

TROUBLESHOOTING

Head Light Cannot Turn On

- Broken fuse
- Open circuit with main cable
- Burnt Bulb
- Faulty Switch

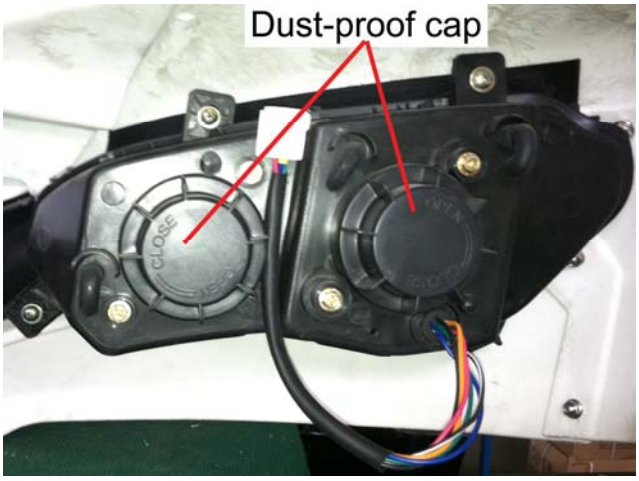
Replacing Bulb



Headlight Bulb

Headlight bulb will be very hot when it is turned on. Do not touch it after it is just turned off.
Operation should be done when the bulb is cooled down.

Remove headlight(→13-5）

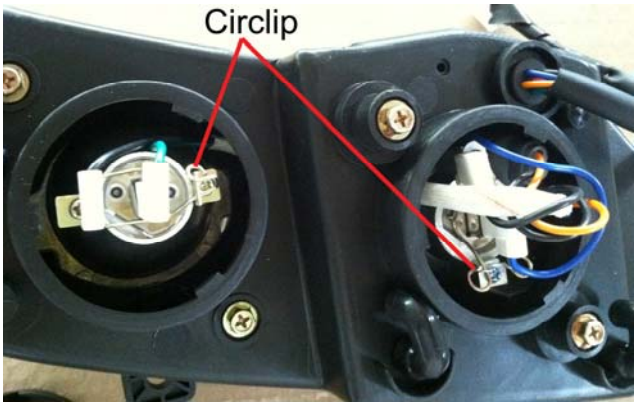


Disconnect headlight.

Remove dust-proof cap, headlight connector, circlip and replace with a new bulb.

Warning:

- Wear clean gloves when replacing bulb.
- Oil stains on the glass surface may cause break of bulb. Clean the stained surface with alcohol or isoamyl acetate.
- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.



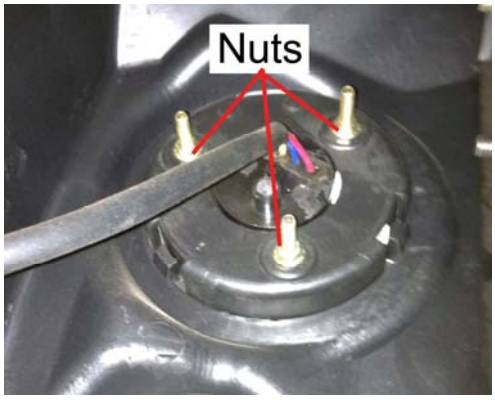
Head lamp: **12 V 55 W× 2**
Front position lamp：**12 V 5 W**
Reverse the removal procedure for installation
After replacing the bulb, adjust headlight beam.

Inspection of Headlight
Turn the ignition switch to ON position, turn light switch to the illuminating position and check if the headlight is on.
-ON: Normal
-Still off: short circuit of main cable or broken main cable.

Front Turning Indicator Bulbs
Remove headlight. (→13-5)
Remove cover of headlight.
Replace front turning Indicator bulbs.

Front direction indicator: **12 V 1.6 W (15*LED)**

Brake Light/Tail Light Bulb
Remove rear corner cover, cargo box. (→2-13)
Remove 3 nuts,
Remove taillight cover.
Replace brake light/tail light bulb
Bulb Specification:
Stop lamp: **12 V 1.8 W (12*LED)**
Rear position lamp: **12 V 0.2 W (12*LED)**
Reverse the removal procedure for installation.

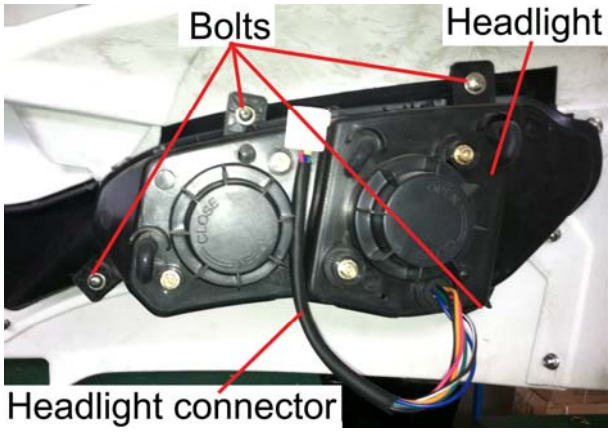


Rear Turning Indicator Bulbs

Remove taillight (→12-4)
Remove taillight cover.
Replace rear turning indicator bulbs.
Bulb Specification: **12 V 2 W (15*LED)**
Reverse the removal procedure for installation.

Headlight

Remove:
—Front air guide cover assy (→2-10)
—4 fixing bolts of headlight.
—Headlight
—Fixed bolt headlight, headlight connector, Headlight



Reverse the removal procedure for installation.

Note:
Be careful not to damage main cable when assembling.

After replacing, adjust the headlight beam.

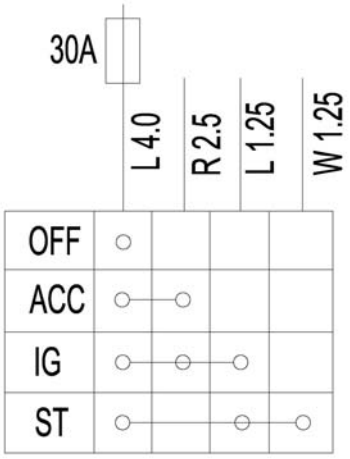
Note
Main cables and wires should be routed properly.

Ignition Switch

Inspection
Remove front cover (→2-11)

Disconnect 4P connector of ignition switch.

Check according to the following table if the connector terminals are in continuity.

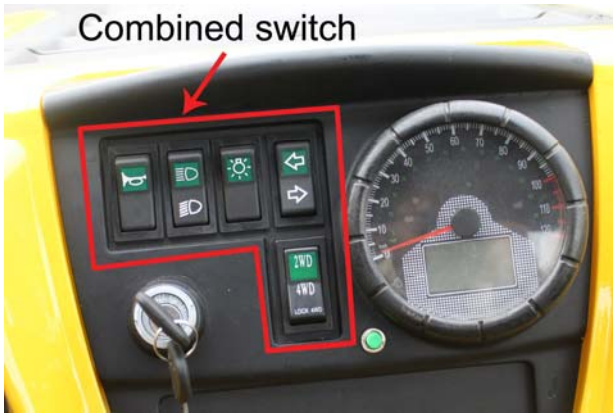


Remove:

Remove meter panel (→2-11)

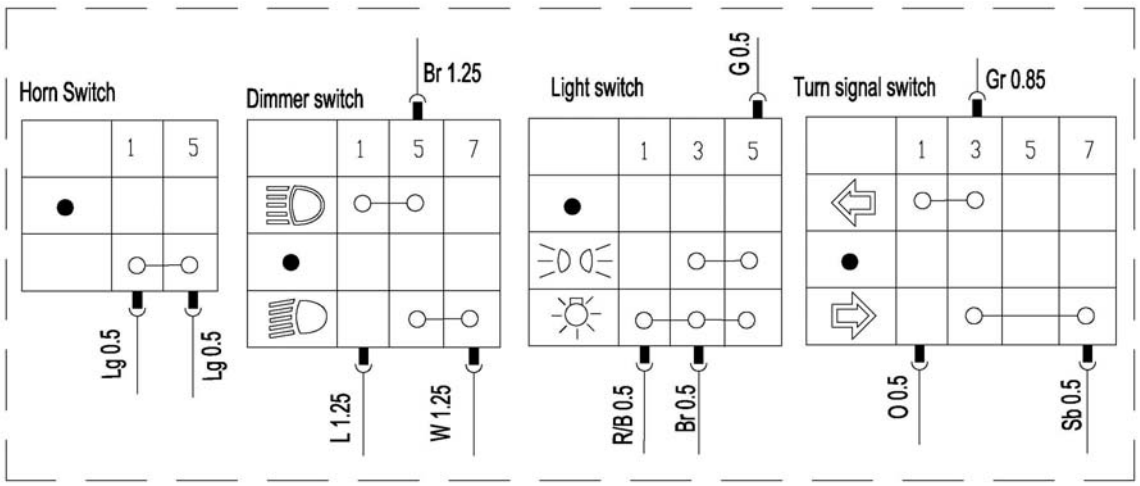
Disconnect 4P connector of ignition switch

Reverse the removal procedure for installation

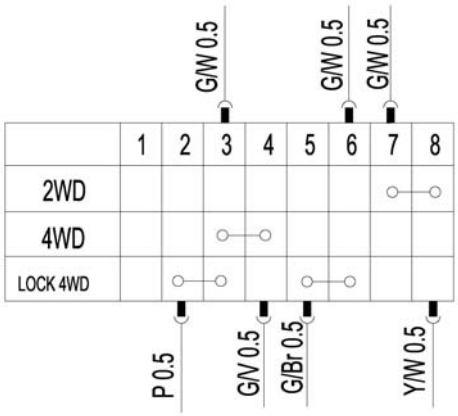


Combined Switch

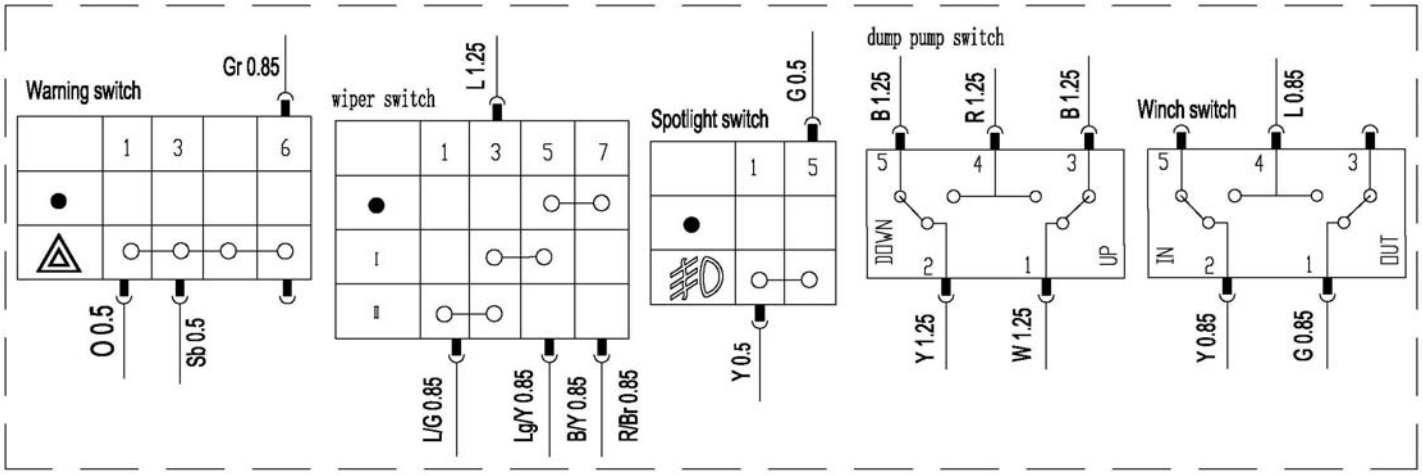
Remove front cover (→2-11)
Remove meter panel (→2-11)
Disconnect connector of combined switch
Check according to the following table if the connector terminals are in continuity.



2WD、4WD、4WD Diff-Lock Switch



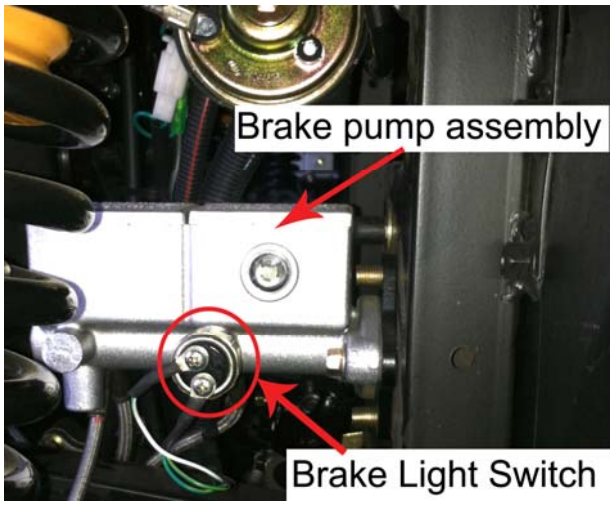
No continuity: Change the switch.



Brake Light Switch

Disconnect brake light switch connector and check terminators for continuity.
Hold the brake pedal——Brake lights are open.
Release the brake pedal—Brake light is off.

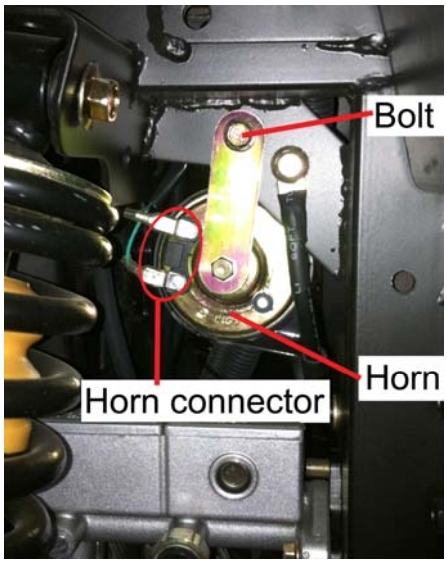
When hold the brake pedal, the brake light is off:
Replace brake pump assembly.



Horn

Inspection:

Remove bolt.
Remove horn connector.
Connect with a fully charged 12V battery and check the horn sounds.
Faulty Horn: →Replace



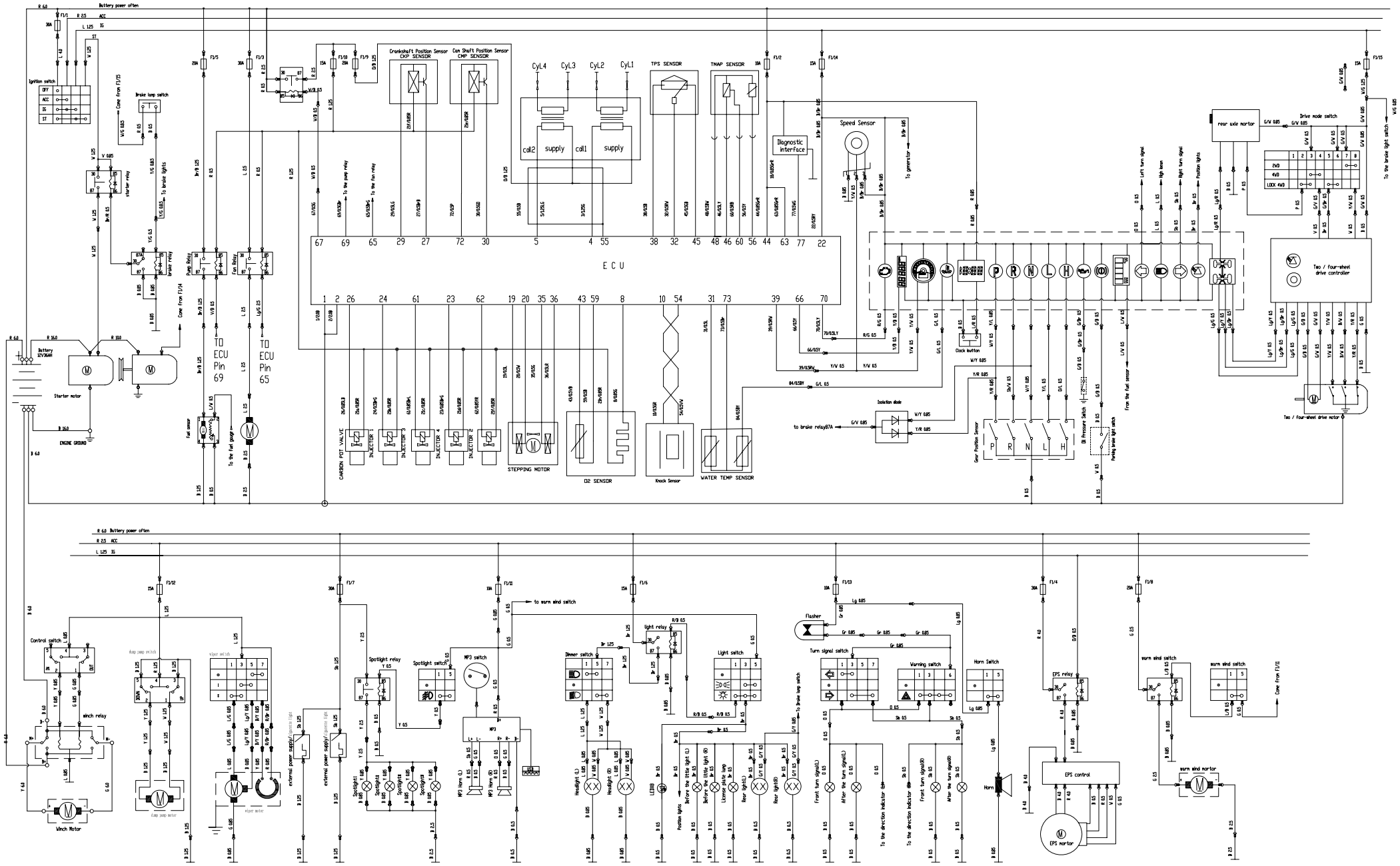
XY1100UE/XY1100UEL **specified fuses**:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ignition switch	Electronic clock/ECU	Fan	EPS	Fuel Pump	Lighting	External power supply/Spotlight	Standby	Ignition coil	Fuel injector	MP3	Wiper/winch	Turning light/Horn	Meter/ECU	Two / four-wheel drive/ brake
30A	10A	15A	15A	10A	15A	20A	20A	20A	15A	5A	15A	10A	10A	10A

16	Standby	15A	17	Standby	30A	18	Standby	10A	19	Standby	20A

XY1100UE/XY1100UEL Specified Relay :

	Sotlight Relay		
EPS Relay	Light Relay	Start Relay	Ignition switch Relay
Fan Relay	Fuel pump Relay	Fuel injector Relay	Flash lamp Relay



Code	R	R/W	B	B/W	B/Y	B/Br	B/L	B/R	G	G/R	G/Y	G/B	G/W	G/L	L	L/R	L/B	L/W	L/G	O	O/B	O/W	O/L	W	W/Y	W/L	W/B	W/G	W/B	Lg/LR
Definition	Red	Red/ White	Black	Black/ White	Black/ yellow	Black/ Brown	Black/ Blue	Black/ Red	Green	Green/ Red	Green/ Yellow	Green/ Black	Green/ white	Green/ Blue	Blue	Blue/ Red	Blue/ Black	Blue/ White	Blue/ Green	Orange	Orange /Black	Orange /White	Orange /Blue	White	White/ yellow	White/ Blue	White/ Brown	White/ Green	White/ Black	Light green/ Blue red
Code	Y	Y/W	Y/R	Y/B	Y/L	Gr	Gr/R	Gr/B	Gr/B	Br	Br/R	Br/L	Br/G	Br/W	Br/B	Lg	Lg/R		Lg/G		Lg/Y		Lg/Br		Lg/B		Sb	Sb/W		G/V
Definition	Yellow	Yellow/ White	Yellow/ Red	Yellow/ Black	Yellow/ Blue	Grey	Gray/ Red	Gray/ White	Gray/ Black	Brown	Brown/ Red	Brown/ Blue	Brown/ Green	Brown/ White	Brown/ Black	Light green	Light green /Red		Light green /Green		Light green /Yellow		Light green /Brown		Light green /Black		Sky blue	Sky blue /White		Green/ Violet

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ignition switch	Clock/ECU	Fan	EPS	Fuel Pump	Lighting	reserve power supply/ignition	standby (warm wind)	ignition coil	injector	MP3/ little light	wiper/Winch dump pump switch	turning light/Horn	water/ECU	Two / four-wheel drive motor
30A	10A	30A	30A	20A	15A	30A	20A	20A	15A	10A	15A	10A	10A	15A